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ADHESIVES AGE

MANUFACTURE, APPLICATION, TECHNOLOGY, RESEARCH AND MARKETING

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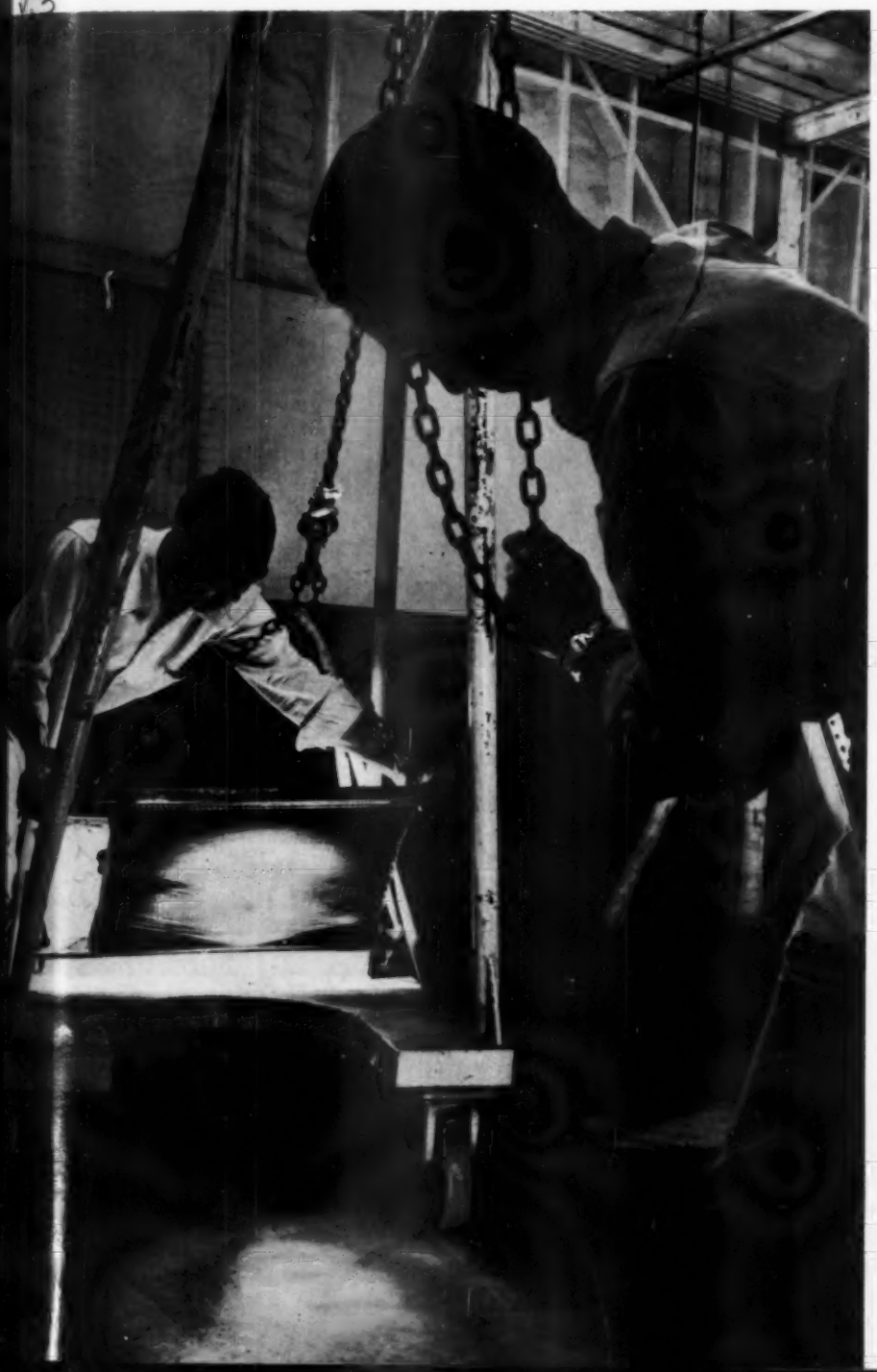

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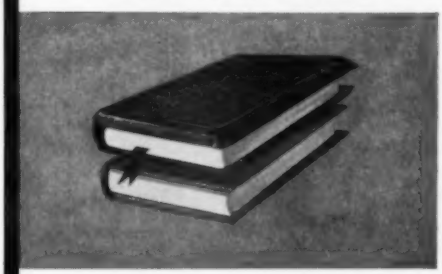

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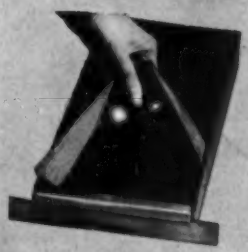

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ADHESIVES AGE

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PALMERTON PUBLISHING CO., INC.

OCTOBER, 1960
VOL. 3, NO. 10

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Indexed in Industrial Arts Index and Engineering Index.

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10,600 Copies of This Issue Printed

ADHESIVES AGE is published monthly by the Palmerton Publishing Co., Inc. Printing Office, Bristol, Conn. Editorial and Advertising Office at 101 West 31st Street, New York 1, N.Y. Subscription in the United States, $5.00 a year; Canada, $5.50; Foreign, $6.00; Single Copy, 50c. October, 1960. Volume 3, Number 10.

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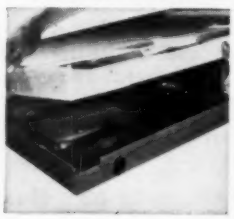

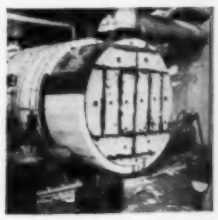

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You wouldn't suppose heat resistance mattered since the foam won't stand too much, itself. However, there are some installations (mostly military) where a void-filling adhesive must resist "creep" at temperatures up to the foam's softening point . . . and under structural loads, at that! For such applications, most foam manufacturers' literature recommend a 100%-solids epoxy such as BONDMASTER M664 or M688.

For technical data and samples of the rubber-resins or the epoxies tell us about your specific problems.

Published Monthly by
PALMERTON PUBLISHING CO., INC.
Editorial and Advertising Offices
[illegible] West 31st St., New York 1, N. Y.
Phone: PEnnsylvania 6-6872

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EDITORIAL

A Guest Editorial

Consumer Education Continued

Relatively large users of specialty adhesives frequently ask adhesive manufacturers to supply an adhesive at a lower price per pound or per gallon than they are currently paying. Competitive pressure to reduce cost is good only if it reduces over-all cost. The cost per pound of adhesive can be over emphasized. Although the adhesive cost is usually only a small fraction of the cost of the finished article, a savings of a few cents per pound appears to be significant and worthwhile.

The adhesive manufacturer by reducing solids, adding filler, or by some other means can usually decrease the cost of adhesive per pound, but there is always a possibility that the cost of adhesion may increase. If more of the lower cost adhesive is needed, there may not be any savings. If the same quantity can be used, it would probably be less costly to use less of the original adhesive.

The real purpose, of course, is to lower total cost. This takes into consideration quality and the percentage of seconds or rejects, production rates, labor costs, equipment needed together with space requirements, maintenance, and depreciation, as well as adhesive costs per bonded unit.

A thorough discussion with the adhesive supplier could possibly lead to savings greater than the value of the adhesive consumed. For example, if an adhesive could be supplied that would cut down the percentage of seconds or rejects, total costs might possibly be considerably reduced. An adhesive that would allow faster production rates could cut labor costs and eliminate the need for additional capital equipment where the amount of production is insufficient or borderline.

Adhesive manufacturers spend a considerable sum on research and development. They are familiar with many types of adhesives and methods of bonding. Their experience and advice is available on request for constructive suggestions to reduce costs and improve quality.

ADHESIVES AGE has already had many editorials on consumer education. If only a few people who might not have otherwise done so, will now look at the cost of bonding rather than adhesive cost alone, this editorial can be considered a success.

JACOB LICHMAN
Key Polymer Corp.
Lawrence, Mass.

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CONSULTANT'S CORNER

By Dr. Irving Skeist

Vinyl to Painted Steel

Question: We manufacture specialty furniture and have recently started a new line of products requiring vinyl film to be bonded to a painted steel surface. There has been some difficulty in getting what we consider to be a proper adhesion.

At present, we are using a vinyl-base, water-reducing adhesive applied to the vinyl film by means of a gluing machine. We let the panels dry for a period ranging between three to five minutes. The panels are then set on a painted steel surface and the unit is fed to our assembly line.

This is our first experience with gluing and we don't feel we are getting the bond we should. Can you steer us in the proper direction to improve the adhesion of these two materials?

Answer: Several changes are in order. A water-base adhesive is not recommended here, since you have two impermeable surfaces and must therefore get rid of volatiles before compositing. You will get faster evaporation by switching to an organic solvent cement.

In place of the vinyl latex, try a nitrile-phenolic cement. This is a blend of butadiene-acrylonitrile synthetic rubber and phenol-formaldehyde resin. It provides good adhesion to steel and most painted surfaces as well as to vinyl.

The painted surface is probably more difficult to bond than the vinyl film; consequently you should try applying the adhesive to the painted side only. If this does not work, you may have to coat both surfaces with cement. Wait for the methyl ethyl ketone solvent odor to dissipate before mating the two tacky-faced adherends.

If you find that the steel itself is more readily bonded than the painted steel, you may prefer to mask the metal in the painting operation over the surfaces that are to meet the vinyl.

Q-173

Dr. Skeist is associated with Skeist & Schwarz Laboratories, Inc., 89 Lincoln Park, Newark 2, N.J. He is the author of the recently published book, "Epoxy Resins."

Pad to Iron

Question: For polishing lenses, we use a pad affixed to a cast iron tool with a concave or convex surface of varying radii, depending on the power of the lens. The pad is glued in place and is used with a water slurry containing a fine abrasive (10-micron range) or polishing powder.

The pad should be easily stripped from the cast iron tool. It should be noted that the pad is subject to lateral surface pressures in varying directions during polishing. What type of adhesive can you suggest for this application?

Answer: A pressure-sensitive type of cement is called for—one that will have good resistance to lateral movement, but poor peel strength so that it can be removed when desired.

A "non-freezing" neoprene, *i.e.*, one that does not crystallize but remains permanently tacky, is suggested. Neoprene WRT is such a material. It is used as a solvent cement containing no vulcanizing agent.

Q-167

Wood to Concrete

Question: We would like to bond wood furring strips to cement and concrete block walls by applying adhesive to the strip in the form of a foamy rope something like the aerosol shaving soap. In this way, when the strip is pressed against the wall it would fill in the irregularities and hold at points other than the high spots.

Such a product would make it much easier to attach strips around window and door openings, in corners, and in other hard to get at spots. I am sure that I have been looking in the wrong places for the right material. Suggestions?

Answer: It would be quite an accomplishment to develop a low-density foam that provides adequate strength for this application. You should get satisfactory bonding and gap-filling from various mastic compositions, for example, an epoxy resin heavily loaded with filler to bring down the cost. Many formulators have suitable compounds.

Q-168

Rubberized Fabric to Cotton

Question: We are producing rubberized fabrics and would like to coat the backs with an adhesive. It must be flexible, adherent to cotton fabric, and immune to the effects of petroleum naphtha. What sort of formulation should be tried?

Answer: Try a butadiene-acrylonitrile synthetic rubber solvent cement. Adhesives of this type are available from many sources. Let the solvent evaporate before mating the two adherends.

Q-171

Readers who would like to contribute their own experience with problems similar to those discussed in Dr. Skeist's column are invited to write to ADHESIVES AGE, *101 West 31st Street, New York 1, New York. Please refer to the code number given at the end of each question and answer group.*

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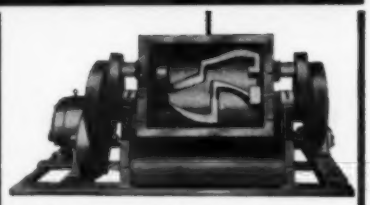
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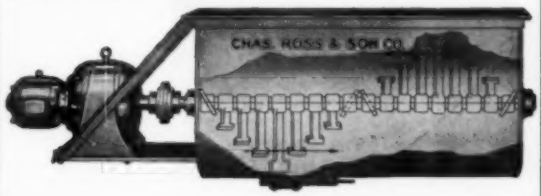

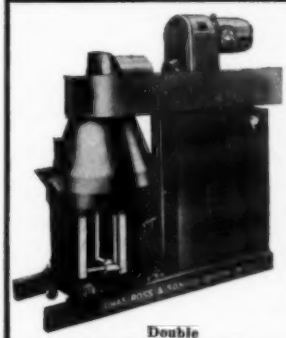
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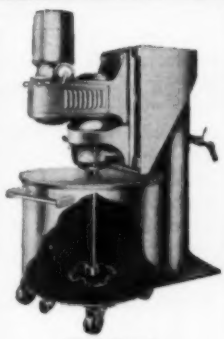
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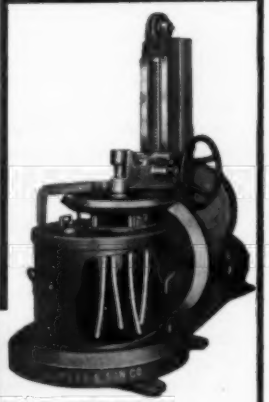
Heavy Duty Change Can Mixers
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new adhesives

AND ADHESIVE PRODUCTS

Rubber-to-Metal Adhesive

Based on a polyurethane formulation, PA-820 is a new adhesive system for bonding rubber to metal. It cures at room temperature to form a

tough, yet flexible bond, states the manufacturer. It may be applied to bare metal. Where preliminary test indicate need for a primer, the metal is first coated with PA-338, a clear epoxy solution that cures at room temperature. The adhesive provides an immediate grip and continues to cure over several days until it reaches an ultimate tensile strength that sometimes exceeds that of the rubber itself. *Plastic Associates* **P-379**

Wall Covering Bondant

Three new resin adhesives are announced for vinyl wall covering. Designated as the V-W-C series, they are: 31-7500, a liquid adhesive for cloth-backed vinyls; 18-0523, a liquid adhesive for paper-backed vinyls, and 53-9100, a water-dispersible, dry adhesive for cloth-backed vinyls. The formulations are said to feature high freeze-thaw stability and strong adhesion to many different types of building surfaces, including sized and unsized plaster, painted and unpainted plywood, cement, cinder block, plasterboard, Upson board and shellacked surface. High tack, long range and long open time facilitate accurate adjustment and positioning, the manufacturer points out. Application is by brush, roller or trowel, and rapid water solubility makes for easy cleanup. Smooth spreading is made possible by special built-in slip compounds. *National Starch and Chemical Corp.* **P-380**

One-Part Epoxy

Meta-Bond 331 is an internally catalyzed and flexibilized epoxy formulation requiring no mixing or metering before use. It provides aluminum bonds of a shear strength exceeding 3000 psi. The bond is stable from -70°C. to 125°C. Because the adhesive is moderately resilient, materials with a wide range of expansion coefficients can be bonded without causing thermal stresses. The epoxy formulation has a minimum shelf life of six months at 72°F. The cure at 250°F. is two-and-a-half hours. At 335°F. bonds cure in 15 minutes. The adhesive is a dark red thixotropic paste which can be applied to clean surfaces with a putty knife or spatula. Applied adhesive may be left on the assembly until ready to cure.Clamping is necessary only on complicated assemblies. *Mereco Products* **P-381**

Urea-Formaldehyde Resin

Cellument is a urea-formaldehyde resin adhesive, with catalyst incorporated, which requires only mixing with water. It developes high water resistance whether set cold, hot or electronically. Assembly of the adhesive-spread sections must be made within 20 minutes. For cost reduction, the adhesive can be extended with industrial grades of wheat or rye flour, depending upon the types of stock and conditions for use. Application is by brush, roller or with mechanical spreader. For a single glue line 35 to 40 lbs. of adhesive are spread per 1000 sq. ft. For assembly, both surfaces should be spread 20 to 25 lbs. per 1000 sq. ft. Working temperatures of the adhesive is 70°F. or higher. *Monite Waterproof Glue Co.* **P-382**

Concrete Resurfacer

Nu-Surface Concrete makes it possible to apply a thin surface coating to old concrete in repairing cracks, spalled and scaled areas and depressions. The compound is prepared before use from a dry mix and a wet material supplied. It can also be applied to blacktop, sealed wood and metal. *Carborundum Co.* **P-383**

Bonding Agent

Hornbond, a bonding agent for concrete-plaster-stucco is a liquid resinous emulsion with surfactants which is said to have excellent adhesive strength. It dries in a thin flexible film which is ageless, nontoxic and vermin proof. The film is unaffected by the alkalinity of gypsum, lime, putty or Portland cement mixes; it will not burn or deteriorate and is not affected through the temperature range from -32°F. to 300°F. It will bond finish or base coat gypsum and accoustical or Portland cement plaster to painted or unpainted concrete block, beams, cinder block, stone, brick, concrete slabs, metal, plywood, tile or rock lath. The agent can be used to bond new concrete to old concrete. *A. C. Horn Companies.* **P-384**

Reinforcing Tape

A new reinforcing tape for vinyl flexible materials, Bostape is a cotton fabric coated with a wetback adhe-

sive. It is applied to the underside of the vinyl sheet. An activator is used to moisten the tape before application. Use of a simple seam roller provides the pressure needed to effect a permanent nonstaining bond of the Bostape to the vinyl, states the manufacturer. An introductory kit available contains a 100-yard roll of one-inch Bostape, a quart of activator and product identification tags. *B. B. Chemical Co.* **P-385**

Resurfacing Compound

Concrete floors in bad condition can be patched and resurfaced with Sta-Crete Formula 15, an epoxy compound, and sand aggregate. A ⅛" surfacing mortar of this formula is said to permanently resist chemical action and abrasive wear. The use of epoxy permits dry-pack patching with feather edges to remain intact. *Sta-Crete, Inc.* **P-386**

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Celanese polyvinyl acetate resins—processed from Celanese-produced monomers—offer adhesives manufacturers the practical advantages of high quality . . . prompt delivery. To meet the demand for PVAc resins we have substantially increased production. Result: High volume . . . a wide range of viscosities and properties to meet your adhesive requirements.

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Celanese CHEMICALS

Celanese Chemical Company is a Division of Celanese Corporation of America.
Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver.
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Ave., New York 16.

Epoxy Stripper

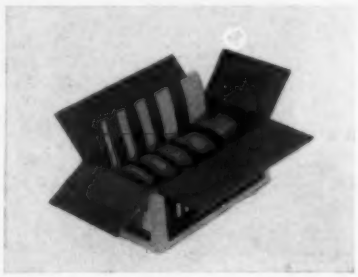
Epoxy and polyester resins can be removed from potted components without danger to parts or materials with a new self-activating stripper designated as Tele-Solv. It will not corrode, discolor or otherwise affect copper, aluminum, ferrous metals or resin-based enamels, the manufacturer points out. The stripping process can be stopped at any time for removal of small parts when complete de-potting is not required. Dried, de-potted parts can be immediately processed. Nonflammable and nonacidic, the stripper requires no special equipment or mixing. *Telecomputing Corp.* P-387

Pressure-Sensitive Boxes

Complicated or involved locking devices on packaging are said to be eliminated with Field-Stik, a new line of self-sealing boxes employing spots of pressure-sensitive adhesive. The closures are simply pressed together lightly and the package is complete, ready for shipping, stocking, etc. *Field Paper Box Co.* P-388

Nylon Tape

Sticking drawers can be made to operate smoothly with Nyl-O-Tape, a new self-adhering nylon tape. The protective paper backing is removed



and the tape simply pressed into place on the drawer track or the underside of the drawer. The self-lubricating tape can also be used to ease operation of sliding doors. It will adhere to wood, metal, plastic, plaster and many other surfaces. *Hardware Designers, Inc.* P-389

Reflective Products

Two pressure-sensitive reflective tapes and a reflective liquid are being made available in consumer quantities. Scotchlite safety tape in one- or two-inch widths is made of the same reflective sheeting as reflective traffic signs and automobile license plates. Chromelite reflective trim blends with chrome by day. Reflecto-Lite reflective coating, is a pre-mixed liquid which may be brushed or sprayed onto any surface. It is offered in six-ounce aerosol containers: enough to cover surfaces of from six to eight square feet. *Minnesota Mining & Mfg. Co.* P-390

Metal Mender

Made of steel in plastic form, Magic Steel is designed for use in soldering, sealing, repairing and filling all metals. It sticks to wood, glass, porcelain, concrete, stones and other construction materials. Applied without heat or tools, the formulation dries metal-hard in two to three hours. It can then be sanded, drilled or painted. Unaffected by water, oil, gasoline and most chemicals, the plastic metal will not rust or corrode, states the manufacturer. Available in sizes ranging from a 6½ oz. tube to one-gallon can. *Magic Iron Cement Co., Inc.* P-391

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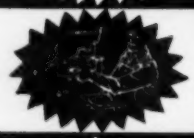

COATING
Trowellable for sealing cracks in walls, concrete pipe, gelcoating of molds and patterns, gloss coating, sheet metal bonding and sealing

LAMINATING
Glass cloth lamination, impregnation of felt and concrete, reinforcement of glass for sheet metal repair, fabrication of ductwork, chemical storage tank lining

FILLING
Aluminum or steel paste for metal repair, sealing of seams, wire rope terminal potting, bonding metal to metal, body work, mounting bolt grouting, filling porous castings

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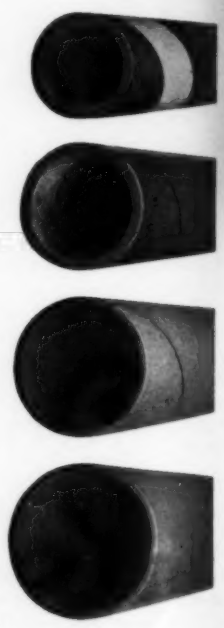

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NEW BRUNSWICK, NEW JERSEY • TAPES • ELECTRICAL INSULATING MATERIALS • ADHESIVES

capitol cues

BUSINESS WILL REMAIN ON AN EVEN KEEL for the rest of this year. Many analysts feel that current doubts about business only reflect the economy's recent dose of bad news: New orders are disappointing; home-building is near 1960's low; retail sales are barely keeping ahead of 1959's; corporate profits are actually lagging a lot behind year-ago figures; and some corporations are reportedly cutting future expansion plans as well as their inventory buying.

But, the economy has some strong underpinnings, too.
-Defense spending is rising and will continue to do so in the final months of 1960. Gains will be small but very helpful.
-Steel production, barely above the year's lows, will improve as the auto manufacturers step up their 1961-model buying.
-Easier money will spur activity in all lines and help most businesses. Lower interest rates will aid many small firms.
-Consumer buying of soft goods will keep rising, with incomes; the experts feel 1961 auto sales will beef up durables sales.

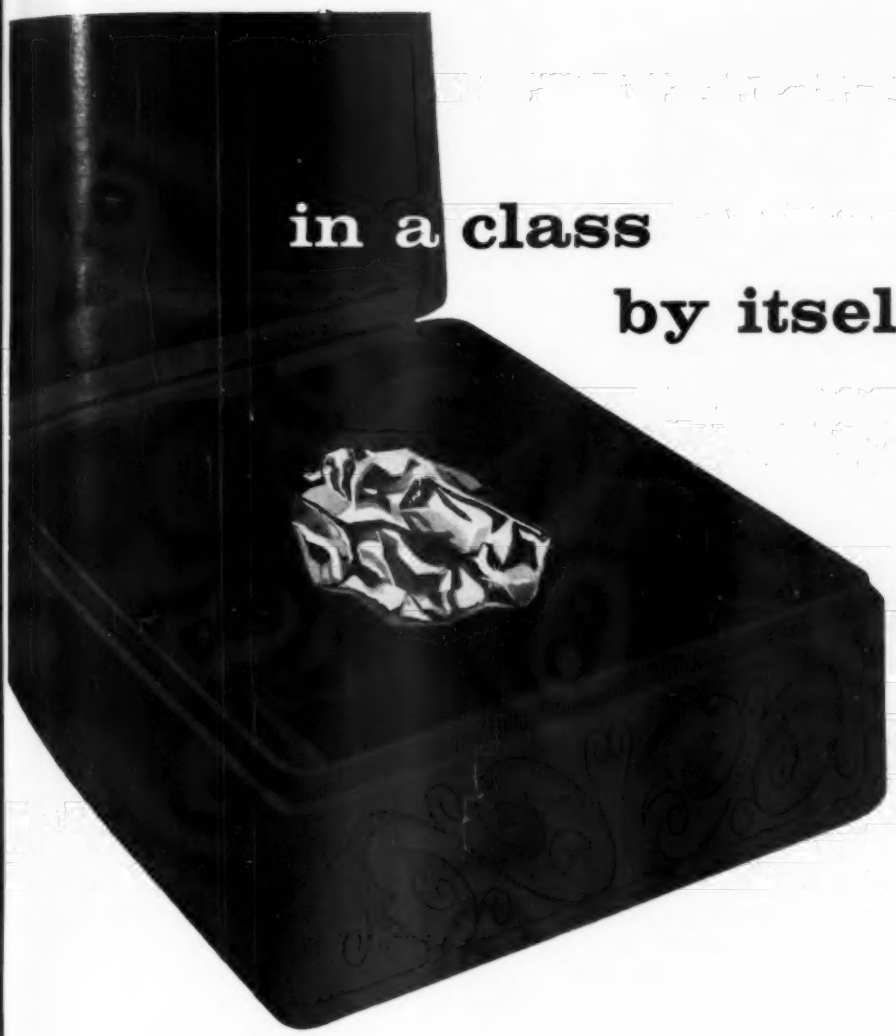
It's worth noting that auto prospects are brighter than some newspaper stories would indicate. Sales in recent months are ahead of 1959 and total 1960 sales will run about 6.7 million.

WHAT WILL 1961 BE LIKE? A sluggish year for U.S. business, over-all. That's the picture as top economists in government and industry now see it. They expect a short, mild first-half easing, with recovery starting quickly. However, analysts see nothing seriously wrong with the economy these days. They feel the American economy is basically strong and will be going through a breathing spell that will set the stage for a real surge in 1962 and 1963.

Here's where the economy will be losing steam as 1961 begins:
-Consumer spending, now the main business prop, will begin to slow down next Winter. After two years of heavy purchasing on credit, folks seem ready to save more of their earnings. The buying of consumer durables, such as autos, won't climb much.
-Inventory buying will slip further as the consumer cuts back. Businessmen are leery about holding stocks that are too big.
-Capital expenditures seem likely to top out in 1961, and then decline. Plant capacity seems adequate for present sales. The correction will be moderate, since recent excesses were few; this sort of slow-down is considered mild, even healthy.

THERE'LL BE SOME PLUSES IN THE PICTURE--it's important to keep this in perspective as the negative signs multiply. These positive factors will partially offset the contractions that are expected in 1961. For example, government outlays--mainly state and local but some federal, too--will be rising; gains may hit $8 billion. Home-building will pick up as the effects of easy money spread. And declines in income will be minimized by built-in stabilizers--social security and unemployment pay--as was the case in 1958.

You can see how mild the '61 dip will be from these estimates:
-Total output of goods and services--Gross National Product--will fall only 1% to 2%. This year, GNP will probably reach $505 billion. Next year, the figure may dip to $500 billion.



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Piccolyte's outstanding advantages are used in caulks, cements, chewing gum, leather treating, paint, paper coatings, adhesives, printing ink, rubber, textiles, and wax compounding.

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capitol cues (cont'd)

DEFENSE SPENDING WILL STEP UP SHARPLY, no matter who wins in November. The platforms of both the Democratic and Republican parties make this clear. The key questions now are how much more will be spent--for what and just when. Size of the increases will eventually be as much as $3 billion a year, say the party planners. Benefitting will be missiles, anti-missile defense, submarines, warning systems, transport planes and conventional arms. The step-up will take several years; by 1963, the economy will really be feeling effects of the rise.

PROSPECTS FOR THIS COUNTRY'S EXPORT TRADE are becoming much brighter. Since 1960 started, exports have been one of the few sectors of the economy to look good. Shipments of planes, copper and steel products, and cotton have all topped start-of-1960 expectations. Sales abroad will total $18.8 billion, as against 1959's $16.2 billion. (Last January's estimate was $18 billion.)

Imports to the U.S., however, are falling short of forecasts. Instead of $16 billion, the figure probably will be somewhere around $15.5 billion. The U.S. is buying less foreign steel, meat, and wool. As a result, the U.S. balance of trade will be $3.5 billion this year, as against $800 million in 1959.

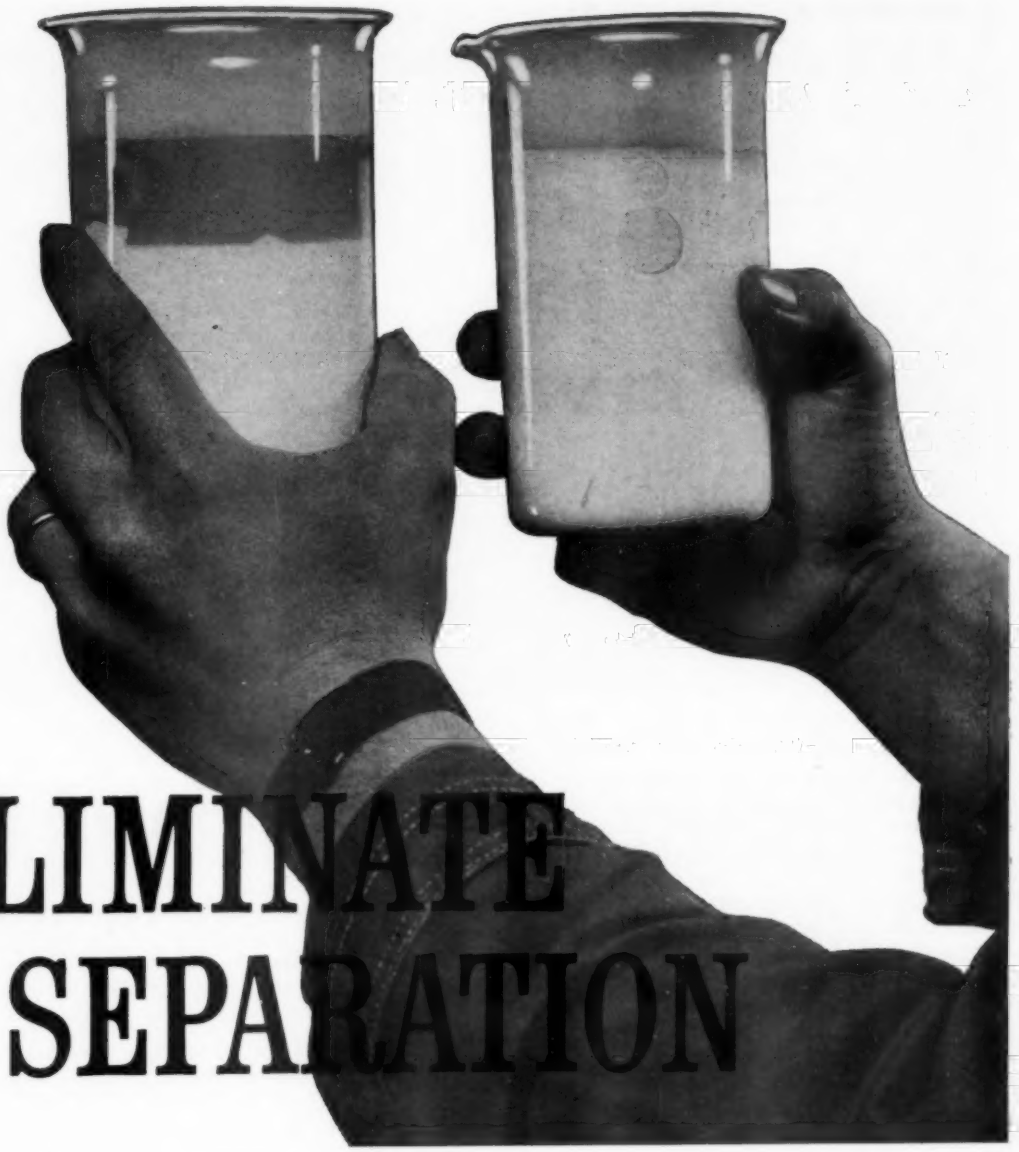
INCREASES IN PRICES ARE STILL FAR FROM OVER, even though inflation is clearly on the wane. Rising wages and higher costs of many materials are still putting considerable pressure on some lines, though the push is much less than it has been. Here's what government experts see for some items:

Construction costs will continue to climb for some time yet. Competition, however, will limit increases to buyers. Wages, materials, and equipment are rising; only interest is down.
-New homes will cost more next year, perhaps 3% to 4% more.
-Industrial buildings will rise, too, by the same amount.
-Road projects will see bid prices drop as competition grows.
-Work on dams, irrigation, etc., may show some declines, but the easing in the coming year won't be as much as 1959's 5%.

Prices of metals will hold their own or climb a little.
-Steel: Prices may go up in December, selectively, if use picks up. That's when a wage boost of 9¢ an hour will be taking effect. Mills absorbed a big hike early this year.
-Aluminum: U.S. experts see a ½¢ a pound increase in the base price. User stocks are low and demand is now rising.
-Copper: Current prices will hold despite the drop in use that's foreseen. The upset in the Congo is firming prices.

There'll be varying trends in consumer prices in the months ahead. Men's suits will rise $2.50 to $5.00; women's wear will go up,too, though relatively less. Shoe prices will hold steady. Meat prices will edge up, with pork rising most. Used car prices will decline and provide good buys.

HOW TO COMPLY WITH THE NEW LABOR DISCLOSURE LAW is spelled out by the Labor Department in a new 43-page Guide. It tells employers what information is required on financial dealings with employees, with unions, their agents, and with labor consultants. It also tells how to report such transactions. For a free copy, write the Labor Department, Washington 25. Ask for TAA No. 4.



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Use new Vinac AA-63 polyvinyl acetate emulsion for compounding adhesives with solutions of fully-hydrolyzed PVA

Finished adhesives based on Vinac AA-63 are more water-resistant than adhesives compounded with ordinary stabilized emulsions and these products do not "cream" or separate.

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AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

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• **Epoxy Resins.** Major aircraft and automobile companies make extensive use of epoxy resins for tooling purposes and they are also widely used for the manufacture of foundry patterns. The electrical industry still retains a very large share of the remaining market. The use of epoxies in adhesives and in glass reinforced structures also continues to expand steadily. Among the new products that have made their appearance may be mentioned epoxy molding powders, epoxy resin systems for application by the fluidized bed process and special resin hardener systems for the manufacture of solvent-free coatings. Epoxy resin and hardener systems heavily filled with cheap fillers, such as sand, are also being used as flooring compounds. All of these new applications could easily provide big tonnage outlets. Another possible large market is in road surfacing.

The steady development of the existing applications of epoxy resins, and even these new developments alone, would seem to justify an optimistic outlook for the future of these products. Many new uses with large potential resin consumption will be discovered in the coming years.

• **Epoxy Adhesives.** It was recently reported that epoxy adhesives are in an advanced stage of investigation for the joining of railway lines. One method describes the removal of joint bars, closing the gaps with an expander, and shot blasting the joint area. Angle bars for each joint are heated in a gas oven, mounted on a push car, the adhesive is applied and the assembled joints cured by the application of heat from kerosene torches.

Epoxy adhesives are also being used for bonding traffic buttons, audible warning strips and the like, to concrete roads. Epoxy adhesives are used in the construction of motorized bicycles, rockets, and for bonding concrete pipes carrying chemical liquids.

• **Soviet Exports Not So Hot.** According to the communist newspaper *Das Freie Wort* published in Suhl, East Germany (Thuringia), the East German glass industry suffered a severe setback a short while ago. Induced by very low quotations, Holland bought a great quantity of bottles, but has been compelled to return tens of thousands of them because the quality was very inferior. At the same time the communist newspaper reveals that a lot of complaints have been received concerning glassware, thermometers and other glass instruments shipped by the Chinese People's Republic. All these instruments were improperly calibrated. The report emphasizes that during 1959 complaints from foreign countries concerning the delivery of glassware from the Soviet territory have increased by 300 per cent.

• **Pressure Sensitive Adhesive Products.** At the Joint Conference on Adhesion held by the London sections of the Institution of the Rubber Industry, "The Relation of Physical Testing to the Use and Characteristics of Pressure Sensitive Adhesive Productions" was explained by J. F. Millard. The desirable properties of pressure-sensitive adhesive products were defined and classified. These properties relate to the usefulness of the product in its end application and test methods in current use are essentially attempts to define these properties, or particular aspects of them in reproducible quantitative terms. Individual test methods were reviewed in this light, with particular reference to officially specified tests, suggestions being made to cover properties not at present so specified. Special emphasis is placed on properties which are strictly those of the adhesive or the adhesive-backing system and which are common to the major groups of products. Reference was also made to the more important aspects of certain specialized products. Collaborative investigation into adhesion testing made by the Adhesive Tape Manufacturers Association was reported.

• **Synthetic Latices.** The latter are now in fairly general use as binders in the world's leading coated paper and board producing countries. Development of the use of latices began in the United States around 1945 and it was well established and developed here before it spread to other countries. However, some countries were rather late in adopting this new development. For example, in Britain the application on a larger scale started around 1956 after the production of the butadiene-methyl methacrylate copolymer latex had been perfected.

• **Neoprene Solvent Adhesives Improved.** Neoprene rubber adhesives are in widespread use in the adhesives field and have been since their introduction to the market a number of years ago. It has been found that neoprene solvent cements may be improved by the addition of phenolic resin. This resin is claimed to improve the adhesive by giving it the following qualities: stronger adhesion of the bonded materials to each other; stronger cohesion of the cement itself; greater strength at higher temperatures; longer tack retention for simplified bonding, and improved

Foamed glass cores, sprayed with neoprene-based adhesive, pass through 275° F. infrared drying oven in first stage of processing cycle. In foreground, porcelainized steel face panel, also sprayed with adhesive, starts through oven.

NEOPRENE ADHESIVE SPEEDS FABRICATION OF SANDWICH PANELS

Ease of application . . . rapid drying . . . and a tough resilient bond are all reasons why Aldrich and Hubbard, Inc., Flint, Michigan, specify a neoprene-based adhesive. Porcelainized and galvanized steel "skins" are bonded to foamed glass and other core materials in the fabrication of panels for curtain wall construction and decorative panels. The result: a strong, lightweight panel.

Strong bonding characteristics of the neoprene adhesive add to the strength of the completed panels.

The company reports that the use of an adhesive based on Du Pont neoprene permits them to operate on an assembly-line basis. The components are spray coated, passed through an infrared drying oven and then mated in a hydraulic press to form the finished panel. At each step, the neoprene adhesive's easy application, quick drying and superior bonding properties offer important advantages.

Neoprene-based adhesives are available from adhesive manufacturers in both solvent and latex types. They can be compounded for application by brush, spray or roller and to meet a variety of service requirements. If you need a better adhesive, ask your supplier about adhesives based on Du Pont neoprene, or write E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department AA-10, Wilmington 98, Delaware.

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NEOPRENE
FOR ADHESIVES

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On the Continent (cont'd)

viscosity stability during aging. Finally, it provides for heat reactivation for faster production, higher resistance to fabric deterioration, and less "legginess" or tendency on the part of the cement to string upon forced separation of the bonded parts.

These properties are of great importance in all general adhesive applications. They are a necessity in many fields, such as shoe-sole adhesives, canvas-to-metal adhesives, adhesives for automobile weather stripping, and adhesives for bonding high pressure laminates to plywood.

• **Adhesivos Resistol S.A. Mexico.** Rubber and Asbestos Corp., in Bloomfield, N.J., has granted this firm a license for the exclusive manufacture and sale of all industrial adhesives produced by the American company in Mexico.

The Mexican factory manufactures all kinds of adhesives and several years ago concluded an agreement with the Catalin Corp. of America, New York, N.Y. Based upon this agreement a mutual exchange of experience and research exists between the two companies concerning the phenolic, melamin, and resorcinol resins which are used for the manufacture of adhesives and also in the paper and textile industry.

• **Glu-Answer Bar.** Wilhold Glues, Inc., Los Angeles, Calif., will install a Glu-Answer Bar at its booth at the National Hardware Show which will be held from October 10th to October 14th in the New York Coliseum. The clinic will offer free analysis of specific gluing problems. It will give glue users the benefit of the firm's extensive knowledge of all types of adhesives gained from laboratory tests and field experience.

About 1000 manufacturers of all kinds of hardware and housefurnishing items usually display their products at the hardware show in the Coliseum. Numerous manufacturers from the United States and many foreign countries visit this special show which is unique as the complete presentation of what American industry can offer in this field. Quite a number of factories manufacturing adhesives exhibit at this show and everybody connected with our special field should try to visit the National Hardware Show in New York. Many manufacturers exhibiting their merchandise are more and more interested in using adhesives on their production line. A number of very valuable contacts could be established.

• **The Shortage of Labor in West Germany.** Here are a number of items on this topic: A menu card in a famous restaurant at a German resort has the following note: Dear Patron, please be very kind to our waiters. It's easier to obtain new customers or guests than new waiters. . . . The mayor of a small Bavarian town asked the local newspaper not to publish any "foreign" classified ads for help wanted. The biggest factory in that village was tired of the constant shrinking of its labor force. . . . A large industrial concern looked for additional help by advertising in many trade papers all over Germany. Not a single reply was received.

• **Leistung in Zahlen.** *Accomplishment in Figures* is the title of a brochure recently published by the German Ministry of Economics in Bonn. Dr. Ludwig Erhard, the German minister of economics and the creator of the German miracle wrote the preface of this very interesting presentation of the German accomplishments during the last ten years. It is interesting to note that West German exports during 1959 amounted to approximately 10 billion dollars, or $180 per capita. The corresponding figures for the United States show that our exports during 1959 totaled 16.3 billion dollars, or $93.46 per capita.

These two figures alone show that Germany has a dominant position in world trade. It is deplorable that our efforts to increase our own exports have been so feeble. We should apply at least twice the energy in order to match the German figures. In view of the deficit in our trade balance we must do much better in order to maintain the leading role of the United States on the world markets.

Those who can read German should find the brochure of great interest. It can be obtained by writing to the Ministry of Economics, Bonn, Germany or by addressing the Commercial Attache of the American Embassy in Bad Godesberg, West Germany.

• **Dow Plastirama.** The well-known house organ of the Dow Chemical Co. has recently started publishing a German edition. We are happy to see an American company doing such a wonderful job in informing German readers about every detail of its activities in the United States. The German edition is equal to the American presentation: the articles are excellent. They are not just translations, but are skillfully adapted presentations of the American contents. The eight-page edition, printed on the finest coated stock, contains a number of excellent illustrations and a very impressive list of Dow representatives and affiliated companies all over the world. We would like to congratulate Dow Chemical for this excellent accomplishment which we feel will contribute to the proper evaluation of America abroad. The German edition not only displays our technical accomplishments, but also shows that we can match the spiritual presentations of other nations by being able to tell our story in the many languages of the world.

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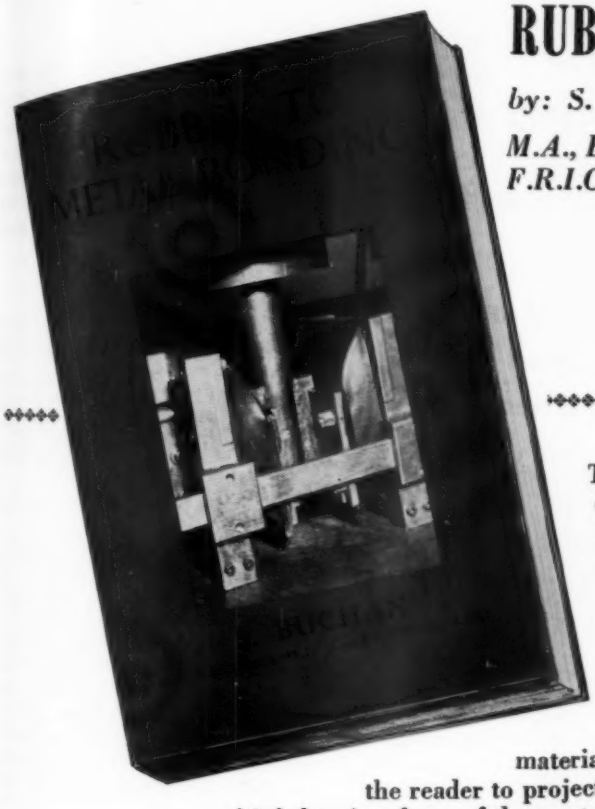

A new fully revised and up-dated edition of

RUBBER TO METAL BONDING

by: S. Buchan

M.A., B.Sc. (Aber.), Ph.D. (Cantab), F.R.I.C., A.I.R.I.

1959, 296 pages, with bibliography

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This new edition of Dr. Buchan's important and comprehensive work, has been completely revised and up-dated to include the many advances and new developments in the technology of bonding rubber-to-metal in the 10 years since the publication, in 1948, of the widely-acclaimed original edition. Describes processes, applications and methods in detail. Gives concise, straight-forward explanations of how to handle rubber-to-metal bonds at each stage of the job. Sufficient materials are included with each description to permit the reader to project given examples to his own needs. Written by the chief chemist of one of the most successful bonding firms in the world, this is the single most complete source of information about a subject of major technical importance to men working in the rubber adhesive industries.

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Bonding Agents, Various
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The Nature of the Rubber-to-Metal Bond
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Bonding Honeycomb Core Laminates

at North American Aviation

Pre-cut components of compressed metallic foil are stretched to full dimension and then bonded to facing materials by a technique which employs cheesecloth impregnated with epoxy

Adhesive laminating techniques developed by North American Aviation, Inc., Los Angeles, Calif., permit the use of honeycomb cores in the fabrication of lightweight, low cost aircraft components with extremely high mechanical strength. The techniques are thought to be adaptable to other applications such as the manufacture of panels for buildings, refrigerators, and automotive equipment.

Honeycomb materials are currently being produced for varying applications from such materials as stainless steel foils and paper. In themselves, they have relatively little strength, but when bonded to such facing media as plywood and sheet metals, they manifest the strength of solid materials which have far more weight. Aircraft parts with honeycomb cores include doors, fuselage side panels, ailerons, elevators, rudders, and trim tabs.

Compressed Metallic Foil

Honeycombs used by North American are metallic foil structures which have been tightly compressed into slabs so that they could be shipped in a minimum amount of space. These slabs are first cut in predetermined stock lengths and widths. The ends of each stock segment are then attached to metal bars so that the compressed materials can be stretched to full honeycomb dimensions with a chain-pulley device.

Next, templates are positioned over the stock segments so that the configurations of different cores or parts can be manually outlined on the honeycomb materials with a sharp knife. Masking tape is subsequently used to outline marks made by the knife in order to minimize the possibility of mistakes when the materials are later cut with a bandsaw.

Basic flat configurations are produced within precision tolerances by processing the core materials with a bandsaw. Where additional details are required, honeycomb cores may be either milled or machined with electrical spark discharge equipment by filling them with water and using a refrigerated chuck to freeze the water. Besides stiffening the parts so that they can be machined without deformation, the ice serves the purpose of a temporary adhesive by assuring the proper positioning of cores in the chuck.

Following machine work, the honeycomb cores are cleaned in a more or less conventional manner to get rid of foreign matter which might prevent their adhesion of facing materials. Then they are positioned on table-top fixtures, on which scribed lines indicated desired alignment.

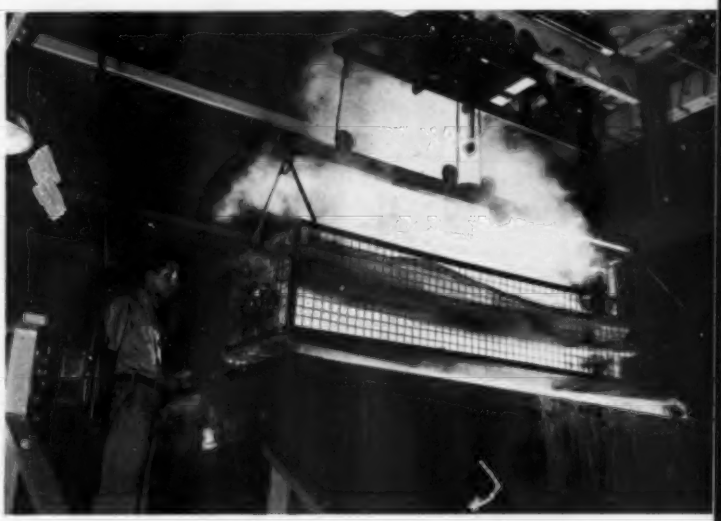
In some cases, a core for only one part will comprise segments machined from honeycombs with two or more thicknesses in order to minimize fabrication time due to large dimensions or extreme deviations in core configurations. When this happens, it is sometimes necessary to fair the core segments with a special saw. This is done after the segments are positioned on a tabletop fixture to obtain maximum surface contact with sheet metal facing materials.

Prior to being covered with their respective facing elements, cores with both single and multiple segments are covered with cheesecloth which has been impregnated with a high-strength adhesive based on the Epon resins manufactured by Shell Chemical Corp. The purpose of the cheescloth is to retain the viscous adhesive at the point where sheet and honeycomb core surfaces must be bonded without minimizing the strength of the bonds between core and facing materials.

Vacuum Table Assembly

Facings are individually assembled over the core materials on a vacuum table, which is subsequently used to maintain close contact between the surfaces to be mated as the adhesive within the cheesecloth is heat-cured in a low-temperature oven. An electronic testing device is used by inspection personnel after each facing component has been adhered to a core in order to ascertain the presence or absence of "air spaces" which determine the quality of adhesive joints between laminae.

Besides having improved strength-weight ratios, honeycomb laminates have reduced the cost of some airframe components by as much as 50 per cent. They have also eliminated the need for many fasteners, such as rivets and bolts, which minimize the aerodynamic efficiency of streamlined surfaces.



1 Top photo shows stock dimensions of the compressed metal honeycomb being stretched with a chain-pulley device.

2 Below, honeycomb core segments of various thicknesses are aligned on a tabletop fixture for fairing with a special tool.

3 The cleaning of honeycomb core materials prior to their being adhesively assembled to facing is shown in top right photo.

4 Center right, cheesecloth is impregnated with adhesive for use in bonding honeycomb cores and sheet-metal facing materials.

5 Assembled components are shown, bottom right, being moved into a low-temperature oven for heat-cure of the adhesive.

By **MAURICE J. RHUDE**

Chief Engineer
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Structural Timber Laminating

A detailed analysis of new adhesive needs called for by the growing use of glue-laminated structural timber in the construction industry

Wood and adhesives have come a great distance these past 25 years in returning heavy timber construction to the building industry. Wood, the greatest renewable resource in the building materials field, is continually being improved and defined for a particular need. We have adhesives for thousands of uses, but the ideal adhesive for a specific wood-bonding job has not yet been developed. If we can define what we really want in an adhesive, the research dollar and the talent to design it for us are available.

Whether choosing an adhesive from the adhesive manufacturer's present list, searching for modifications to them or specifying new adhesives, consideration must be given to the material to be bonded. In the case of wood, its cellular structure is responsible, to a considerable degree, for its characteristic differences as a structural material. Most structural materials are essentially isotropic, with approximately equal properties in all directions. However, wood is anisotropic and exhibits three mutually perpendicular axes of elastic symmetry.

There are three recognized grain directions: longitudinal, radial and tangential. High strength and stiffness exist parallel to the grain with the strength across the grain being considerably lower. Wood strength in tension parallel to grain is 25-40 times the tension perpendicular to grain strength, and the strength in compression parallel to grain is six to ten times the compression perpendicular to grain strength. Wood has not just a single modulus of elasticity, but three, varying as much as 150-1.

Swelling and Shrinking

Wood is also unlike most structural materials in regard to the cause of its dimensional changes. The thermal expansion of wood is so small as to be unimportant in ordinary usage. Changes in dimension are from gain or loss of moisture. Dimensional stability would then refer to the ability of the material to withstand swelling and shrinking caused by moisture changes.

The total swelling and shrinking of wood also varies in the three structural directions, being about 6-15 per cent tangentially, 3-7 per cent radially, and only 0.1-0.3 per cent longitudinally. Parallel to the grain, wood is strong, stiff and very dimensionally stable. Across the grain it has its least strength, it is not stiff and there can be problems with dimensional stability.

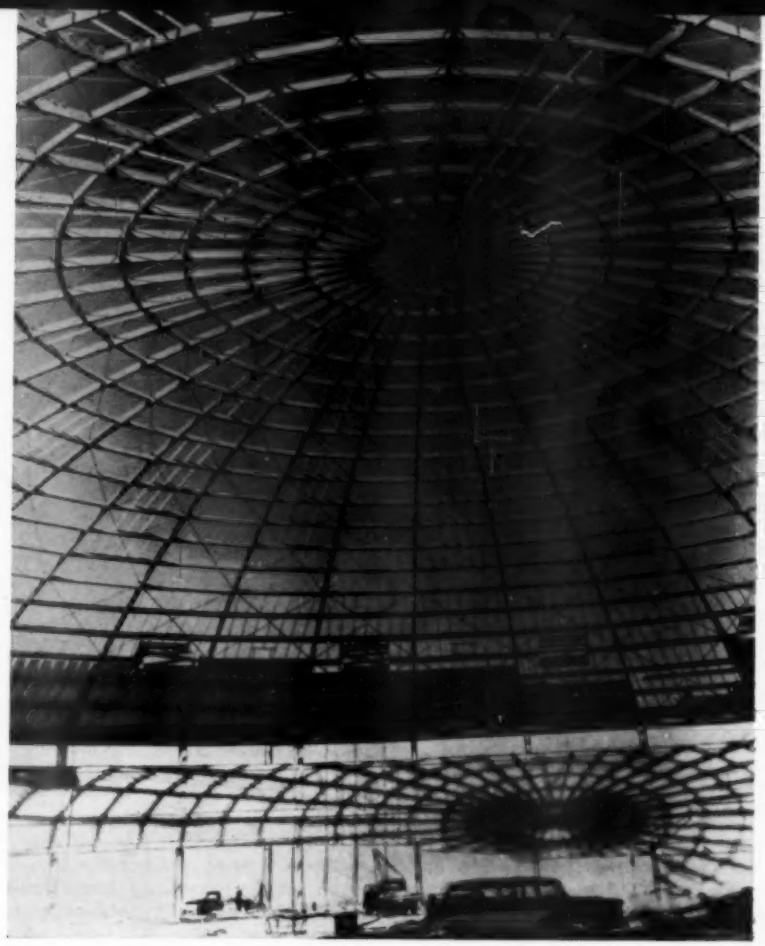
Would it be possible to develop an adhesive with direction properties? Structural designs in wood must be both strong and stiff. A rigid adhesive is needed to bond the laminations together as deflection frequently will govern in a design. Both the strength and the stiffness of the adhesive are factors that will affect the performance of a glued joint. Ideally, the modulus of elasticity of the adhesive should be the same as that of the wood. Since this is difficult to achieve, it is then preferable that the modulus of the adhesive be smaller, rather than larger than that of the bonded material.

Wood is known to have excellent impact resisting properties. Very rigid adhesives may fail under impact. On the other hand a rubbery adhesive may be objectionable from

the standpoint of creep and strength. Obviously, some compromise between these two extremes would be the most suitable adhesive.

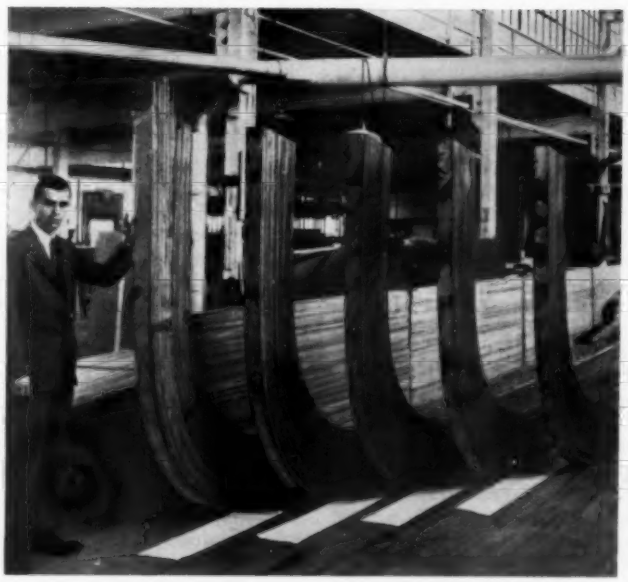
Adhesive properties desirable during fabrication vary with the type of gluing to be done. Bonding the horizontal joints of laminated members parallel to grain—side grain to side grain—is the most common and simplest gluing operation. The glue line may be only a few square inches or it may be 100 square feet—depending upon the length of the member to be glued and the number of glue lines.

Edge gluing to make *wider* boards of narrow lumber is a similar operation. However, gluing end grain to make *long* boards of short ones presents problems because end grain is the most difficult surface to machine and the most difficult gluing task for



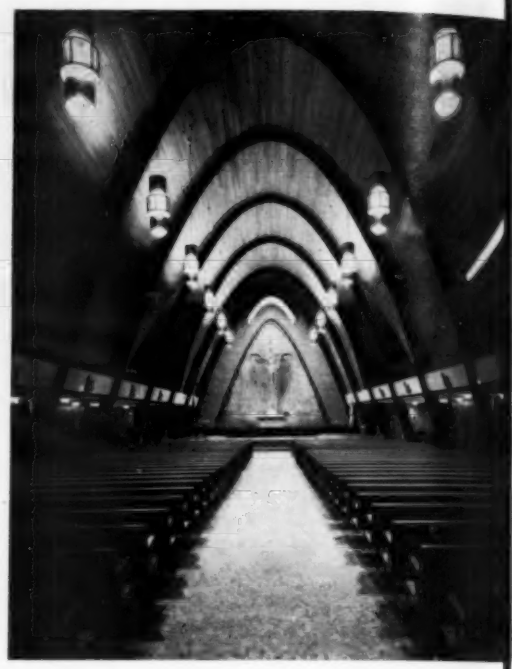
Auditorium at Montana State College was constructed with laminated arches and has a clear span of 300 feet.

Glue-Laminated structural members provide the framework of this Navy wood minesweeper shown here in launching position.



A phenol-resorcinol adhesive was used to laminate the structural components of this stem and keel assembly for a small U.S. Navy vessel.

Glue-laminated structural timber was used in the spans for this framework of a high school auditorium in Port Arthur, Texas. The main diagonal arches are 215 feet.



The largest parabolic glue-laminated arch used in St. Bernard's Catholic Church, Middleton, Wisc. is 52 feet and nine inches. The largest transept arch is 49 feet two inches.

the adhesive. The production of a strong and durable bond upon surfaces containing the cut-off ends of thousands of small, hollow wood fibers is a real challenge.

End joints are not large surfaces, varying from the long, plane scarf to the short, finger joint. Reasonably good strength ratios are obtained with plane scarf joints; a great deal of work is being done to improve the design and fabrication of the finger joints since it is so much less wasteful of material.

The end joint, while the most difficult gluing problem, fortunately holds the most promise for early improvements. The need for a long pot life adhesive with appreciable assembly time does not exist. In addition, there appear to be promises of a fast-curing, room temperature setting adhesive for scarfs.

When designing an adhesive around the fabrication process, we must consider the surface preparation of the materials to be bonded, the method of adhesive application, and the heat and pressure to be used in curing.

The adhesive must stick to the bonding surfaces, or to put it another way, the liquid adhesive must have the physical property of wetting the surface under the proposed method of application. In addition, since time and temperature play vital roles in almost all gluing work, the equipment used must make allowance for the time-temperature relationship. Any rapid method of laminating must reduce the time under pressure; heat is often utilized to accelerate the adhesive cure. The adhesive selected and the time and temperature for curing determine the amount of automation possible in laminating.

Synthetic resin adhesives set faster as temperatures increase. A rule of thumb is that a rise in temperature of 18°F. doubles the rate at which the chemical action of setting takes place.

However, temperature sensitivity is a two-way factor. We want a long pot life and a short setting time. A low temperature helps the first and hinders the second. Temperature is therefore both the ally and the enemy of the laminator. The best procedure is obviously to keep the adhesive cool in storage, apply to the mating surfaces at temperatures consistent with the assembly times required, and then later heat the glue lines when the member is in the clamps under pressure. It must be remembered that in a glue joint the adhesive film is small indeed compared to the large volume of wood. A cool adhesive placed on warm wood will quickly reach the temperature of the wood and have a decreased setting time. Conversely, cold wood can slow down the reactivity of the adhesive. Since wood is a good insulator, it will demand a longer clamping time to allow any elevated ambient air temperatures to penetrate the glue line and cause it to set.

One way of classifying adhesives is by the bonding temperature required. The insulating properties of wood mean that heat applied to the surface will require some time to reach the innermost glue line. This then brings up the question as to whether room temperature (68°F. to 86°F.) or an elevated temperature would be best for curing. Application of heat to a laminated member is only to set the adhesive and it should be remembered that temperature effects take place only when the temperature reaches the glue line.

Several methods are used in structural laminating to bring this heat to the glue line and thus shorten the adhesive setting time:

(1) Heat is applied to the surface of the member with the thermal conductivity of the wood being relied upon to take the heat to the glue line. Special curing chambers with steam or hot-water pipes, dry kilns, electric infra-red radiant heating and hot press platens have been used.

(2) Radio frequency is used where voltage is applied across the material and heat is generated in the wood or glue line itself due to the excita-

tion of the molecules at this very high frequency.

(3) Low voltage resistance heating is employed where a high current is passed through a strip of thin metal. The wood temperature is raised as well as the temperature of the glue line if the metal is in close contact with it.

(4) Laminations are preheated to increase the reactivity of the adhesive when applied. This requires rapid handling of multiple laminations and adhesive application, as a wet or dry film, simultaneously to all laminations. This method has not proven satisfactory with present adhesives because laminations preheated to a high temperature level result in very critical assembly times.

Curing the adhesive at room temperature has many advantages:

(1) The good insulating properties of wood need not be working against us.

(2) The equipment mentioned previously for bringing elevated temperatures to the glue line is not required.

It therefore follows that renewed efforts should be made by laminator, adhesive manufacturer, and equipment manufacturer to develop fast-setting, room-temperature curing adhesives and the accompanying fabrication procedures.

The correct adhesive for structural glued laminated timber is one that maintains an adequate bond between the laminations for the conditions of exposure to which the joint will be subjected. Specification wording such as "beams completely or partly exposed to the weather shall be laminated with waterproof adhesive" is inadequate. Reference to the condition of use as interior or exterior is certainly not adequate.

Water-resistant and waterproof have been used in the past to differentiate the use of casein and the modified phenolresorcinols—the current work horses of the laminating industry. Waterproof adhesives would be required for wet-service conditions where the glue line will be exposed to free water or the relative humidity of the air when the adjacent wood can go beyond the 16 per cent moisture content level. This means a relative humidity of 80 per cent or above for repeated or prolonged periods.

These conditions of service must be known and specified so that the best adhesive can be selected.

Initial joint strength must be of such a level as to allow handling of the assembly when removed from the clamp pressure. Several days may be necessary for the bond to reach its final and required strength and durability. The initial strength at time of removal from the clamps may be but a fraction of the ultimate strength. Prior to machining or other rough handling there should be extended time for bond strength development. In other instances, good bond strength may be required when the assembly is removed from the clamps for service.

Laboratory test procedures have been devised to test the adhesive and the wood acting together to withstand stress due to dimensional changes. Such procedures involve subjecting the joint to a series of differing temperatures, humidity and moisture conditions, usually this is done on a cyclic basis.

A perfect wood adhesive would glue end-grain to end-grain, glue all species equally well, produce strong, stiff and durable joints, have considerable gap-filling properties, cure upon contact with little or no pressure, allow long pot life and assembly times but rapidly set after being clamped, be tolerant of temperature over a wide range, be ready-mixed by the adhesive manufacturer and be compatible with wood preservative chemicals.

The material to be bonded, the type of joint, the fabrication process, the condition of service, the level of initial joint strength, the strength stiffness and permanence—as well as the cost—must all be considered in selecting an adhesive for a particular use.

However, it is best not to even dream of a perfect adhesive which will do all gluing jobs with equal effectiveness. The final choice of adhesive for a specific job will usually be a compromise of the several factors involved.

About the Author . . .

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Waterproof vinyl membrane is sprayed on. Second coat follows in an hour.

Vinyl Coating Vital in Church Design

Though functional and decorative, exterior protective coating is rarely considered a basic factor in architectural design. Solid evidence as to its positive contribution, however, is presented by the recently completed Independent Congregational Church in St. Louis, Mo.

Principal feature of this impressive structure is the roof which thrusts upward from the ground in nine sharp peaks, presenting a gleaming white expanse of sprayed-in-place vinyl membrane coating. The cleanly sculptured lines are unmarred by joints and discontinuities that are found in most roof treatments.

"The use of stressed-skin panels," explains architect Ed Dieckmann, "helped us to create an exterior that is a modern, repeated statement of the ages-old spire. But we could not have achieved the symbolic purity of the unblemished white roofwall surface, nor permitted it to be so prominent a feature, had we not had available a continuous, in effect, one-piece roof covering."

The coating system used on the roof consists of a 1.5-mil vinyl primer followed by two spray applications of vinyl based on Bakelite resin. It was supplied by the Plas-Chem Corp., St. Louis, Mo., and is commercially designated as the Ceco-Flex No. 1500 Elastic Vinyl Membrane Coating System.

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Adhesives in Bag Manufacture

Improved water-resistant adhesives, developed jointly by St. Regis Paper Company and Corn Products Company, have proved extremely successful on seams and bottoms of multiwall bags produced at the Franklin, Virginia, plant of St. Regis. By combining a special blend of starch and dextrine with urea resins, adhesives have been developed that will withstand water immersion for more than 24 hours. The paste possesses uniformly stable viscosity combined with long working life. It affords greater uniformity at no extra cost, and tacks fast enough for the highest machine speeds in use today.

Because of the greater water resistance, multiwall bags made with the improved adhesives are now being used to safeguard such products as chemicals, plastics, lime, cement, fertilizers, animal feeds and food products, and are giving unprecedented protection under severe conditions of moisture and humidity.

The first adhesives tried in water-resistant multiwall bag manufacture were borated dextrines. These were followed with a mixture of sodium silicate, starch and dextrine.

These earlier adhesives were far from satisfactory, however. Often they did not possess the requisite water resistance. When first used on the seams of multiwalls, they lacked sufficient tack. This slowed down the machines. Moreover, after pasting, the seams would sometimes spread or come apart causing tubes to fly open. These pastes frequently had to be run hot to prevent gelling.

Because of their short pot life, they had to be prepared in small batches and used almost immediately. Some of these pastes caked so hard that washing and cleaning the machines interrupted production for long periods. Now these early adhesives have been replaced by St. Regis with a starch, dextrine and urea resin formulation for use in its new stepped-end multiwall bags which make for an easily stacked square package.

Improved Water Resistance

By far the most important advantage of the new bag adhesives is, of course, their greatly improved water resistance. Even if they did not possess other advantages, this alone would justify their use. In fact, it was the development by Corn Products of its No. 7211 starch and its use by St. Regis in seam paste that in large measure enabled St. Regis to produce improved water-resistant bags successfully.

In water immersion tests, pasted seams held together by adhesive made with No. 7211 easily withstand immersion for 24 hours—the minimum required by St. Regis—and often last 36 to 40 hours or longer without ceasing to pull fiber. Certain laboratory samples of such pasted seams have even remained intact as long as a week. In contrast, seams pasted with previous borated dextrine adhesives lasted only five or six minutes when immersed.

A second advantage of the new seam paste, and a most significant one, is its uniformly stable viscosity. This results in better operating control during cooking and cooling, and in longer storage life. In the St. Regis laboratory at Pensacola, samples of this paste have been kept for as long as 30 days with almost imperceptible change in viscosity. For this reason, one of the 1000-gallon storage tanks in the paste room at Franklin can safely be kept filled with finished paste over each weekend, and lines require cleaning only once every two weeks. This is easily accomplished by flushing water through them for a four-hour period.

At the usual temperature and acidity, seam paste made by cooking No. 7211 starch with urea resin has an average pot life of up to five days. After that the resin begins to set or cure. This is necessary to develop water resistance of pasted seams in finished bags. At Franklin, St. Regis reports a minimum working life for liquid adhesive of at least three days, a significant convenience from the standpoint of manufacturing operations.

Unlike earlier water-resistant adhesives, which didn't have sufficient

tack and therefore slowed down the operation of the tuber, the new seam paste tacks fast, enabling the machine to run at high speed. Improved initial tack of the adhesive results from the action of the dextrine it contains. The new paste bonds seams in approximately four minutes.

Seam paste made with the new adhesive causes no discoloration of seam lines due to pH of the paste. Its pH is 6.0 to 6.5.

The improved water-resistant seam paste now used at Franklin costs no more than previous less satisfactory pastes. In fact, by careful formulating St. Regis has actually been able to make the new seam paste containing No. 7211 starch for approximately 15 per cent less than a borated dextrine paste that is not effectively water-resistant.

The Franklin plant has five bag manufacturing lines, together with sewing equipment. The new St. Regis stepped-end bags, as well as bags of other types, are made on an improved universal tuber and a new Burroughs bottomer. Both machines were designed by St. Regis engineers and built by the company. Depending on type and construction of bag, speeds of 250 to 350 tubes per minute can be achieved on the new tuber. The bottomer will turn out stepped end or regular pasted bags at speeds of 100 to 140 bags per minute, depending on type, size and construction.

Requirements for the various types of paste are stringent. Function of the cross or spot paste, applied first, is to hold the inside plies together at the top and bottom ends. Seam paste is applied just before the side edges of the paper are joined at the heel of the former to produce the tube. The seam paste holds the paper plies in alignment, and makes the final seal or seam in the tube.

Both seam and spot pastes must act much faster than bottom adhesive. The seam paste especially must set quickly to prevent the seam from moving or slipping under strain when the tube is bottomed only a few minutes after the seam has been glued. Bottom paste is generally thicker or more viscous, and seals shut the already formed and creased tube at the bottom end. This final step completes the manufacture of the bag.

For efficient performance of the new tuber, the spot or cross paste must have a minimum viscosity at 90° F. of 1000 cps. and a maximum of 2000 cps. It has to be extremely short, fast drying, pressure resistant and free flowing. It should not sling or throw. It must resist grease, acids and alkalies, withstand heat and cold, and not crystallize. It should be water resistant. Most of all, the adhesive must give a bond stronger than the paper. It should have a binding time on 50-lb. natural kraft of only two to three minutes.

To meet these requirements, St. Regis recently developed its own special formulation based on polyvinyl acetate. Because it dries almost instantly, this special spot paste enables St. Regis to produce finished bags in a continuous operation. Conveyors can be run from the tuber to the bottomer, and freshly pasted tubes can be bottomed almost immediately. Previously, tubes had to be stacked on skids to dry before they could be bottomed.

Dextrine, starch and urea resins provide a new water-resistant adhesive for multiwall bags

The seam adhesive does not have to be pressure resistant, though it must possess all the other qualities required in cross or spot paste. Binding time is extremely important. Seam paste must have a binding time of only two to four minutes since the tubes are bottomed at Franklin within minutes after they are formed.

Viscosity of the adhesive is critical when the tuber is running at high speeds. It should stay within 1000-1200 cps. at 90° F. Higher or lower viscosity can cause channeling of the adhesive by the paste wheels, overflowing of adhesive, skipped seams, stringing, throwing, application of adhesive in the perforated areas or other troubles.

Bottom paste must be short though with sufficient flow, have resistance to squeeze, and possess good tack. Besides being water resistant, it must have stable viscosity (70,000-80,000 cps. at 80° F.), be non-crystallizing, and withstand extremes of heat and cold after it has dried on the bag. It should have a binding time of eight to ten minutes on 50-lb. natural kraft.

Bag manufacturers have long sought a wholly satisfactory seam adhesive that would, upon drying and curing, become water resistant. The new adhesive meets these requirements by combining starch and dextrine with a salt catalyst. The urea formaldehyde resin is added just before cooking. The resin apparently combines chemically with the starch in this formulation, changing its redispersing characteristics.

Urea formaldehyde resin is far more effective than formaldehyde in making starch water-resistant. Uncured urea resin is water soluble, and can be readily incorporated in an aqueous dispersion of starch. However, it can be cured by acidity or heat to produce a highly insoluble polymer. It is therefore most useful for developing the water resistance of a starch adhesive.

Starch is essential in the new seam paste not only for its adhesive action but also to get the necessary water resistance at the lowest cost. A film of polymerized urea resin by itself is easily friable. On the other hand, when starch, together with dextrine, is combined with urea resin, the resulting seam adhesive shows good bond, no loss of adhesion, and no friability.

Moreover, water resistance appears to depend upon the copolymerization of urea resin with the starch. Dextrine and resin, without the starch, do not develop adequate water resistance.

Just how water resistance develops during the curing is not exactly known. It is certain, however, that the combination of starch and dextrine adhesive with urea formaldehyde resin, when properly cured by catalyst-developed acidity, produces an adhesive bond that is much stronger after soaking than the paper surfaces it unites.

Selection of the proper starch for the adhesive base is crucial in forming a water-resistant paste with urea resin. The ease with which the starch and resin combine will depend on how much the starch has been modified or degraded. The less the starch has been broken down or disorganized, usually by hydrolysis, the fewer free hydroxyls there will be in its molecular structure, the easier it will be to insolubilize, and the less resin will be required to develop water resistance.

Offsetting this, however, is the requirement that the starch must be

modified or hydrolized sufficiently to get the requisite flow characteristics in the finished paste. For as the starch is cooked it gelatinizes or becomes pasted, and its viscosity increases. Moreover, it is mainly the thickness of the starch that determines the viscosity of the finished adhesive. Therefore, the starch must be modified considerably so that it will not thicken too much when cooked.

Accordingly, the new No. 7211 starch is a specially modified thin boiling product of the pearl type, hydrolized to lower its viscosity. A thin boiling starch is employed to increase the solids without thickening the finished paste unduly.

To get the fast initial tack required in seam paste for high machine speed, dextrine is necessary even though it adds to the cost of the formulation. The type of dextrine used will determine how much water is needed to prepare an adhesive of proper working viscosity, tack, drying time, bond and adhesive film flexibility. Corn Products uses a white, low-soluble dextrine.

Since the dextrine is more highly hydrolized than starch, its addition must be carefully limited. Only enough must be added to give sufficient tack. The dextrine also helps to increase the solids without thickening the paste too much. And since the finished paste must be acidic for curing to occur, an acid dextrine is used to avoid an increase in pH.

The salt catalyst is incorporated in No. 7211 for seam paste to develop water resistance reasonably soon after the adhesive is applied.

Best results from the standpoint of pot life and machine operation are achieved when the starch and dextrine are cooked with urea resin at about 195° F., and a pH between 6.0 and 6.5, in the presence of a salt that can act as a plasticizer and catalyst for the reaction between starch and resin. Seam paste made this way cures and becomes water resistant within five to seven days after it has been applied.

Water resistance is similarly developed in bottom paste by the combination of starch and urea resin during curing. The bottom paste, however, which has a slightly lower solids than seam paste, is made with Corn Products No. 5063. While it is also thin boiling, this starch has not been modified or hydrolized as much as the thin boiling starch used in seam paste which is less viscous. Since bottom paste doesn't have to tack as fast as seam paste, no dextrine is required.

The modern glue room at the St. Regis Franklin plant contains two large cookers and one small cooker for making adhesives, plus two large storage tanks for finished batches. The large cookers have capacities of 325 and 300 gallons and are equipped with ribbon-type and gate-type agitators, respectively.

St. Regis cooks only with direct steam. The cookers are jacketed for cooling water. Cooking is automatically controlled by recorder-controllers that chart the time-temperature cycle. Finished cooks are discharged by gravity to 1000-gallon horizontal storage tanks, where agitators keep the paste in constant motion.

In making seam paste, the operator first runs water at about 65° F. into the 325-gallon horizontal cooker until the water comes within 21 inches of the top, a total of about 142 gallons.

After turning on the agitator, he adds one pound of stabilizer and then three pounds of neutral soap as flakes. The neutral soap gives a smoother paste, helps to minimize any tendency toward gelatinization, and acts as a lubricant for the adhesive when it is being pumped.

Adds Fine Particle Clay

Next, the operator adds 100 pounds of fine particle clay. The clay helps to hold the adhesive on the paper surface, especially in porous or slack sized paper.

The No. 7211 starch is then gradually added a bag at a time, with agitation, until a total of 700 pounds has been introduced. Ten per cent of the dry powdered urea resin, based on the starch solids, is added next.

Heating the batch to 195° F. by direct steam takes about one hour. Three pounds of defoamer are added when cooking temperature is reached, and the batch cooked for ten minutes at 195° F. The pH is adjusted after cooking, if necessary, usually by adding 0.75 lb. of alum. A finished batch comes to within four inches of the top of the cooker, and contains about 201.3 gallons of water, with steam condensate furnishing 44.3 gallons of this total.

The batch is dropped or discharged into one of the storage tanks at not less than 120° F. In the storage tank, with its thermostatically controlled cooling coils, the batch is cooled to 90° F. It can then be pumped into the other storage tank or directly to the machine. A finished batch of seam paste weighs 2561 pounds.

Bottom paste is similarly prepared. The operator runs about 142 gallons of water into the 325-gallon cooker, bringing the water level to within 21 inches of the top. With the agitator running, he then adds wetting agent and neutral soap flakes.

Next, the operator introduces the Corn Products No. 5063, a thin boiling starch. The starch is added a bag at a time, with continuous agitation, until the contents of seven bags, 700 pounds of starch, has been dumped into the cooker. Then the powdered urea resin is added—eight per cent based on the dry starch.

(text continues on page 32)

About the Authors . . .

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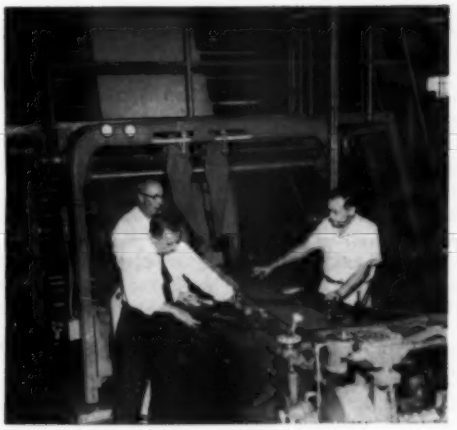
Step-by-Step Manufacture of Multiwall Bags

1
Authors inspect fresh batch of seam paste in 325-gallon cooker at the Franklin plant of the St. Regis Paper Co.

2
Checking application of seam paste on universal tuber. The scalloped paste wheels travel at same speed as paper.

3
View of paste pot and wheels on the tuber. Scalloped wheels do not apply adhesive in tube's perforated area.



4
Inspecting seam paste application of moving web of plies. Adhesive is a mix of urea resins, starch and dextrine.

5
Tubes are fed sideways in new bottomer. Moving in exact registration, tubes are either angle scored or split.

6
Bottom paste is fed to pans on the bottomer from a 55-gallon drum by a pneumatically operated device.

The batch is heated by direct steam to 190° F. and cooked for 30-45 minutes at that temperature. A preservative is added after cooking, and if necessary the pH is adjusted, to 6.5-7.0. A finished batch of bottom paste comes to within four inches of the top of the cooker. It contains about 207 gallons of water, of which 44.3 gallons is steam condensate.

Since it is thicker or more viscous than seam paste, the bottom paste is dropped at 140° F. to facilitate its discharge from the cooker. At that temperature, it flows readily.

The pH of these adhesives is extremely critical. The paste must be acidic enough for curing to take place and water resistance to develop. However, it cannot be too acidic since that would shorten pot life. The pH of bottom paste ranges from 6.5 to 7.0. Seam paste has a pH between 6.0 and 6.5.

Just as are the samples from all St. Regis bag plants, control samples of paste batches made at Franklin are carefully tested in the laboratory at Pensacola, Fla. Solids content of each paste is determined by refractometer, pH by a Beckman meter, and viscosity with a Brookfield viscosimeter. Water resistance tests are, of course, all important. Different methods are used for seam and bottom pastes, but both employ water immersion.

Seams pasted with water resistant adhesive are tested by fastening a 100-gram weight to one end of an inch wide strip with pasted seam, then hanging the strip in water at 70° F. and timing how long it takes for the pasted seam to come apart and the weighted end to fall.

In testing bottom paste, samples cut from the pasted bottoms of newly manufactured bags are first dried normally under weight for eight hours and then placed in an oven for two hours at 200° F. Each sample is then soaked in water at 75° F. until fibers no longer tear. To meet water resistance requirements at St. Regis, the pasted seam should still pull fiber after at least 24 hours of immersion.

The advent of the new improved water resistant adhesives is giving a strong impetus to the use of multiwall bags. As demand by industry for water resistant bags increases, more and more multiwall plants are following the lead of St. Regis and converting their entire output from regular to the new water resistant adhesives.

Filter element retainer bands are formed to precise diameter on a mandrel. The ends of the wax impregnated paper strip are wiped with a solvent, to remove surface wax, and then a single drop of adhesive is used to bond the retainer band.

Bonding Filter Bands

A switch in adhesive techniques cuts the time required by this production line bottleneck by approximately 50 per cent

The production rate of replaceable-type oil-filter elements at the Elmira, N.Y., plant of the Hilliard Corporation has been substantially increased through the use of a technique sparked by a quick-setting adhesive.

The filter element consists of a perforated metal tube surrounded by a pleated paper cylinder held tightly against the tube with two wax impregnated paper bands. The entire assembly is sealed in a perforated jacket made of aluminum, steel, or wax paper and is available in a variety of lengths and diameters for various industrial and military applications.

The wax impregnated paper bands are formed to a precise diameter by wrapping a strip of paper around a mandrel and cementing the overlapping ends. Formerly, the ends were bonded with a heat sealing tape using a hot iron. To assure sufficient bond strength, it was necessary to wait until the bond cooled before removing the band from the mandrel and slipping it over the end of the compressed filter element.

By removing the surface wax from the ends of the paper strips with a solvent and substituting Eastman 910 Adhesive for the heat sealing tape, the time required for this operation was reduced by approximately 50 per cent. The adhesive is a product of Eastman Chemical Products, Inc., a subsidiary of Eastman Kodak Co.

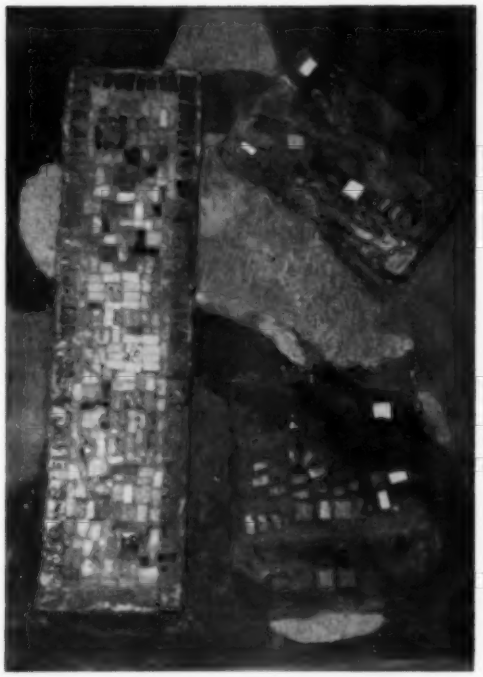
The retaining bands are vital to the proper operation of the filter, for a failure at this point would allow the pleated paper cylinder to expand within its perforated jacket and to permit unfiltered oil to flow directly through the unit. During the past year, since the adhesive has been used to form the bands, there has been no record of such failure.

Normal service life of the filter is from four to six months, during which it is subjected to oil temperatures as high as 180°F.

Bonded bands are slipped over the end of a compressed pleated-paper filter element which must last from four to six months.

The texture and light values of adhesives contribute to the over-all composition of collages

Adhesives and Abstract Art



Collage at top is entitled "Aerial View with Billboards." The materials used were mosaic tessarae, adhesive and textone. "Victorian Remnants," left, uses cement, silver, adhesive and textone.

Ordinarily considered as strictly utilitarian, adhesives recently made their debut in the fine arts when a Madison Avenue art gallery put on a one-woman show of 28 "canvases" by Elizabeth Friedenberg.

Classified as "collages" by the Galerie Internationale, the works are a combination of painting and sculpture, using conventional oil paints and wood, iron, bits of jewelry, fiber glass, ceramic, burlap and other unconventional objects. An important departure in Miss Friedenberg's work is that the adhesive is not only used to bond the various components together, but, more importantly, to provide its own texture and color to various areas of the composition.

"While experimenting with glues, mastics and other stickums needed to bond all sorts of materials firmly and permanently into my compositions," Miss Friedenberg explains, "I became fascinated by the tones, textures and light values of several of the Miracle Adhesives products. I have been using them ever since just as I use oil paints, clay, or any other medium of artistic expression."

Industrial Themes

Some of the works in the show were completely abstract, but most had easily recognizable "themes." Throughout the collection it was obvious that the artist, who comes from Shreveport, La., finds great inspiration in American industry, its structures and materials. Especially noteworthy in this respect is a work entitled "Design from Industry," and described in the gallery's catalog as a composition of "concrete, Miracle Adhesives, and found material."

Others of similar concept include "Souvenirs from a Smithy," concrete and found material; "Facade Sideshow," concrete, Miracle Adhesive, textone on wood; "Gothic Facade," oil, Miracle Adhesive, fiber glass, and burlap on canvas; and "Aerial View with Billboards," mosaic, textone, and Miracle Adhesives on wood.

"I thought I was up on every area of use for our products," notes Lloyd Cutler, president of Miracle Adhesive Corp., Bellmore, N.Y., "but their use as an art medium is a startling surprise even to me. Apart from being a fine cultural achievement, Miss Friedenberg's accomplishment should be a lesson to us in the industry never to assume we've thought of everything, never to limit the reach of our imagination and ingenuity."

Resinous Bonding Agents Provide Strong Bond Between Concrete and Gypsum Plaster

Application of the resinous film base by either brush, spray or roller provides a strong concrete-to-plaster bond without using expensive lathing

By **PHYLLIS H. LARSEN**
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Ten or twelve years ago, there was no way to confidently and successfully bond gypsum plaster to a poured concrete structure—beams, walls, ceilings. Bituminous materials, for example, which had been used for some years, were disapproved in the 1946 ASTM Manual, because they "do not provide ideal bases for plaster. The application of plaster to masonry or concrete which has been coated with such compounds should be discouraged.

The need for a reliable method for bonding was urgent. Buildings of flat plate construction were being more widely designed. Ceilings, especially, were often left unfinished. Costly attempts were made with imitative plasters. Lathing was prohibitively expensive and cement slurries had proved inadequate. It was not until the development of synthetic resins that the medium of a reliable bonding material was realized. At this point, you might say, a new industry was born, destined to revolutionize many construction techniques.

The first and original, now patented, product of this nature which has been used successfully for nearly ten years is a scientifically compounded bonding material* utilizing the unique properties of emulsified polyvinyl acetate resin. Additional components contribute to the adherence of wet mixtures of plaster, cement, mortar, etc. to substrates such as monolithic concrete, old painted plaster, stone, glass, ceramics and metals.

Costly plasticizers are added to impart permanent flexibility to the resin as adhesion insurance and protection against vibrations and stresses which might otherwise loosen the plaster. Solvents soften the resin to facilitate strong initial adhesion, and gums improve the flow of the agents. Film formation is enhanced by special coalescing agents and color is added to provide for identification and rapid inspection. Finally, fire-retardant chemicals help meet local regulations.

A film of the bonding agent is applied to the substrate by brush, spray or roller. Intimate contact of the resin particles with the cementitious material is obtained by the re-moistening or re-emulsifying action of the water in the wet plaster or Portland cement with the resinous film. Provision must be made for adequate curing of the topping material for stucco and other cement work, and thorough drying of the bonding agent. This is necessary to obtain a strong bond and avoid cracking, buckling and ultimate loosening of the topping.

When a polyvinyl acetate bonding agent is used as a base for plastering, a three-way bond is formed. First the liquid bonding agent penetrates the pores of the substrate to form a mechanical interlock. As the agent's moisture evaporates, adhesion develops within and on the surface of the substrate forming both mechanical and adhesive bonds between the two elements. Finally, the bonding agent penetrates voids of the new material and forms a mechanical and adhesive bond. The crystalline structure of new material establishes a chemical bond between the bonding agent and itself.

Laboratory tests made on such three-way bonds show no loss in bonding strength even when wet

About the Author . . .

PHYLLIS HOLMAN LARSEN took over the management of Larsen Products Corp. upon the death of her husband, Herbert Larsen, who developed the formulations now marketed under the names of Plaster-Weld and Weld-Crete. She is a graduate of Wheaton College, Norton, Mass., and the Chamberlain School of Retailing.

plaster was bonded to the resinous film which had been brushed onto concrete one year previous.

A resinous bonding agent of this type produces a film which is ageless, non-toxic and vermin proof. Unaffected by the alkalinity of gypsum lime-putty or Portland cement mixes, its viscosity is about that of a good paint. The agent is resistant to most acids, will not burn or deteriorate, and its lasting flexibility correlates to its ability to re-emulsify upon contact with the wet cementitious finish covering.

The dried film of a well-formulated bonding agent is impossible to break or snap. Use of a polyvinyl acetate emulsion that dries to a hard and brittle film is an invitation to trouble.

In our modern buildings, especially multi-story buildings of reinforced concrete, bonding agents play a most important role. The concrete surface of the columns, beams, walls and ceilings are all relatively smooth and can be utilized for a plaster finish with a minimum of cost. Applying a bonding agent to such areas and bonding a thin (as thin as ⅛" or even less) coating of white lime-putty plaster produces an excellently finished surface.

Impressed with the imaginative style of the numerous buildings designed by a Los Angeles architectural firm, I asked why they chose the medium of flat plate construction, while other firms seemed to prefer the suspension ceiling system.

It was explained that the poured concrete slab design may be curved, angular, or geometric. It is not limited to fabricated shapes using structural steel of specific dimensions that have to set at square angles to one another. In addition slab design is less expensive since extra floors could be obtained within a limited number of feet in height by utilizing the space wasted in the suspension system.

A case in point is the beautiful, new Imperial House in New York City. This 33-story luxury type apartment house utilized plaster bonding materials to simplify and economize in the plastering phase of construction. Concrete frame construction and flat plate ceilings were employed and the surfaces finished by using plaster bonding agents to bond a finish white lime-putty plaster directly to the concrete.

In terms of dollar value, the most important aspect of the advent of liquid bonding materials has been that they permit application of finish plaster to concrete. This enables a

Workman sprays a film of emulsified polyvinyl acetate on the underside of concrete slabs at the Nashville, Tennessee, Public Housing Project. The bonding agent can also be applied by brush or roller.

Finish plaster is applied over a coat of the bonding agent. The technique can be used for substrates such as monolithic concrete, stone, glass, ceramics, metals and old painted plaster.

plastering contractor to bid against two separate contractors for flat slab work—the cement finishers who would quote on the cost of honing and grinding the concrete ceilings, and the painter.

During the construction of a public housing project in Nashville, Tenn., 60,000 yards of concrete ceilings were sprayed with a polyvinyl acetate bonding agent before receiving a white skim coat of plaster. The original specification called for grinding the joints and painting at this PHA project. The specs were changed—when it was proved that a sand float ceiling could be applied over the concrete, at 20 per cent less cost using the modern bonding method.

Similar savings have been reported from many parts of the United States. More recently, the New York City Housing Authority allowed an option in their specifications for use of a bonding agent on concrete surfaces in lieu of the specified finish.

Another quite different use of a bonding agent was made in the construction of a spectacular ceramic tile mural, 30 x 34½ feet. It contained 34,000 pieces of ceramic tile and required a year to plan and design. This highly imaginative mural is located in the buildorama exhibit of the DuPont Plaza Center, Miami, Florida, and is sponsored by the American-Olean Company.

In this unusual assignment for a bonding agent, the bonding material was used to bond the fresh cement mortar bed to the old wall surface prior to setting the ceramic tile. Bonding agents were also used in the construction of the DuPont Plaza Center.

An example of a heavier duty type of bonding with the resinous material** is the interesting installation at the Eaton Manufacturing Company's Cleveland plant. The Eaton Company had to install two 75-ton milling and drilling machines, 25′ by 67′, on the concrete floor of the plant. The machines had to rest on the piers, rather than floor itself, and forms required for single pour of these mounts were expensive.

A heavy duty, resinous bonding material was brushed on 36″ thick base floor at spots where 80 piers were to be located. With the simplest of forms, these 8″ thick piers were later poured with assurance of a permanent bond to the base.

Another interesting application was made at the nation's first underground ballistic missile silo—a deep concrete nest for the 110-ton Titan ICBM, located at strategic Vandenberg Air Force Base, Lompoc, Calif. On the blast pad at the rocket launching site, a bonding agent of the type heretofore described was used to permanently bond fire resistant concrete to base concrete.

The fact that a bonding agent would bond in this location had been proved earlier at a rocket test installation where temperatures reached 5000°F., and the thrust at rocket nozzle was in excess of 30,000 lbs per square inch. An idea of the tremendous forces with which the bonding product was involved can be had if one notes that in one experiment the pressure moved a steel plate, 24′ x 24′ of 1″ thickness, a distance of over 300 yards in the first ten seconds of firing.

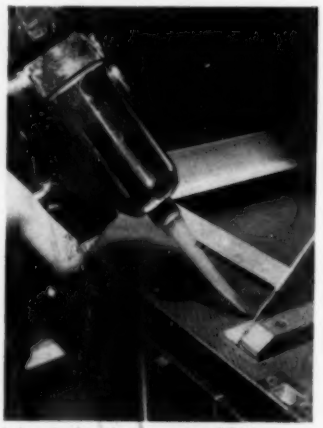
Bonding materials of the vinyl acetate emulsion category are relatively new products. The rapid growth in their use by the building industry has kept manufacturers on their toes adapting to new requirements for these materials.

The future? It can be said that new applications will continue to appear and that bonding materials will more and more become an indispensable ally of the plastering and Portland cement concrete industry.

This article is based on a talk given at the Spring Conferences of the Building Research Institute.

*Plaster-Weld **Weld-Crete. Both these bonding agents are manufactured by Larsen Products Corp.

Sealed Against Corrosion and Incrustation



A bead of sealant is gunned into the seams of the in-flight galley to prevent corrosion.

Skygalleys, in-flight feeding equipment produced by REF Mfg. Corp., Mineola, N.Y., are protected against corrosion and incrusted food particles by treatment with two different sealants. First, a thin coat of EC-776 is brushed onto all faying metal surfaces to prevent rust due to condensation. Next, a narrow bead of ED-800 is gunned into the seams as a further precaution against corrosion. This operation also prevents food particles from lodging in the seams. Both sealants, products of Minnesota Mining & Mfg. Co., St. Paul, Minn., are nontoxic.

Completed Skygalley is given a final check before being made ready for shipment.

FACTORING:

What it Means to the Adhesives Manufacturer

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Because they are engaged in a relatively new industrial field, with new products and applications appearing almost daily, adhesive manufacturers searching for an effective financial tool may very well find that in factoring they have a strong natural ally and a particularly useful one.

Just what is factoring?

Factoring is a method of financing that brings immediate cash payment to a manufacturer for goods sold on credit, guarantees him against credit loss on merchandise sales, and relieves him of the entire chore of extending credit and collecting bills. Businesses that factor are usually manufacturers who sell their goods to processors, wholesalers and retailers.

A factor contracts to buy a client's accounts receivables for cash as soon as the client creates them by shipping goods to a customer whose credit the factor has approved. The client sets the terms of sale; he may even give extra dating, but the factor makes the cash proceeds available to him the moment he reports that the merchandise has been shipped. When the customer has accepted the shipment as satisfactory, the factor assumes full risk for collection of the debt, with no recourse to the client who has sold the goods.

In addition to the dynamic fiscal advantages to be derived from factoring, several other unique considerations make it of particular interest to the adhesives manufacturer.

(1) In the adhesives industry there is a strong demand to experiment and the principal responsibility of the adhesives manufacturer is to develop and produce marketable adhesives. By relieving him of the heavy, time-consuming burdens of financial maneuvering and credit-function supervision, factoring leaves the manufacturer free to concentrate on creating new products that will capture the customer's interest, on producing them with maximum efficiency and economy, and promoting and selling them with imagination and vigor.

(2) The advantages a manufacturer derives from financing through an organization which has a specialist's understanding of the problems of his own suppliers and customers are readily apparent. The factor necessarily has an understanding of the wide range of industries which constitute the adhesives manufacturer's resources and markets. Chemical manufacturers, agricultural products firms, woodworking firms, furniture assemblers, plastics laminators, producers of plastic wall coverings, shoe, luggage and paper manufacturers—all these represent industries which are among the major users of factoring.

(3) A strong, long-established factoring organization, in the conduct of its business both as a supplier of financing and as a grantor of credit, amasses, over the years, a tremendous fund of information as to the most attractive customers in all parts of the nation. This is an invaluable aid to the factor's clients in rapidly developing industries, such as adhesives, in which new products or new applications for existing ones frequently lead into totally unfamiliar fields of distribution.

These are a few of the plus values, over and above the direct financial benefits inherent in the method, that have led to a tenfold increase in the use of factoring in the last twenty-five years. Today, factoring is employed in virtually every manufacturing field and is the preferred financial instrument in many of them. The annual volume of factored business in the United States is more than $4,000,000,000.

Individual techniques of factoring service may vary, but the basic operating steps are largely as follows:

(1) Client notifies factor he has booked on order.

(2) Factor makes all necessary investigations of customer's credit and reports promptly to client.

(3) Client ships order to approved customer and sends him an invoice carrying a printed notice telling him to pay the account directly to the factor. Two copies of the invoice are sent to the factor.

(4) Factor credits sale to client's account at once.

(5) Client can then draw all or

any part of the cash therefrom whenever he wishes.

(6) Factor maintains accounts receivable ledgers and makes the collections from client's customers.

As a natural result of these operations factored firms can sell their merchandise aggressively in expanded volume without risk of credit losses. In addition, terms, dating and similar inducements which enable them to compete more vigorously impose no burden on operating funds, and as their volume grows they generate through factoring a constantly increasing supply of liquid capital instead of freezing more and more of their money in support of receivables. The net result is that through accelerated working capital turnover, manufacturers have funds available as needed to meet their obligations promptly and earn their discounts. In many situations, this saving can defray a substantial part of the cost of financing.

Advances Against Sales

In addition to "cashing" clients' sales on shipment of orders, the factor also finances them by means of advances against projected sales. When a client's budget of operations for a forthcoming season indicates a need for current funds, the factor provides the accommodation by letting him overdraw his account so that in effect the client collects immediate cash payment for future sales.

While these advances are made without maturity date, the client recognizes them as seasonal accommodations to be paid out seasonally. Usually they are made without security but with the understanding that the client generally will adhere to his budget and not make material changes in purchasing, production or shipping plans without consulting the factor beforehand.

The accommodation may be secured by inventory when the added protection of such collateral appears desirable. However, the well-established, experienced factor places greater reliance on the safety afforded by an intelligent and careful study of the client's financial and budgetary controls and management qualities.

Although factors are primarily short-term institutions and provide the bulk of their financial support through the purchase of accounts receivable, many of them under certain circumstances make longer-term loans to clients for plant expansion, equipment purchase, acquisition of other businesses, payout of estates, and other special needs.

Who should factor?

The trade area which benefits from factoring includes firms expanding rapidly on limited capital, firms selling to customers who represent unusual credit risks, firms facing unusual seasonal problems, firms whose capital has been reduced for various reasons but which have the potential to maintain former volume.

On the other hand, there is little to be gained through factoring for a company which has no need of the factor's credit service and requires only nominal seasonal accommodation for brief periods. Nor would a business selling only on very short terms or for cash, or selling only to a handful of top-notch firms, be likely to factor. In addition, factors do not accept service businesses as clients, or firms whose customers are not recognized businessmen with formal credit ratings.

A prime example of a company which finds its natural financial ally in the factor is one in which, because of constant expansion, financing requirements beyond net worth are virtually of a permanent nature and periodic cleanups with a bank are inconvenient for the client to meet. For a firm which a commercial bank may consider to be overtrading in relation to working capital and net worth, factoring can provide a most efficient instrument for cleaning up a long-standing bank loan and at the same time creating the foundation for comfortable financing of the same or possibly even larger sales.

How does the factor's credit service function?

A goodly number of companies considering the use of factoring have the mistaken idea that they would be giving the factor complete veto power over their sales, and thus curtailing their market. On the contrary, the only way the factor can make money is by cashing the client's sales; consequently, the factor's main objective is to find a reason to approve credit.

Extending credit to client's customers is virtually the factor's primary business. As a result, he has credit department manpower, facilities and contacts that few individual manufacturing companies can afford to maintain on their own. The factor, moreover, has a far wider spread of risk than most individual manufacturers enjoy, and can accept risk much more readily than his clients.

Can a factored firm have banking connections, too?

There are many situations in which a factor and a bank work hand-in-hand for the same client. For example, the factor can handle the client's accounts receivables on a maturity basis, with the bank supplying the financing. Companies able to obtain ample accommodation from their banks often make important use of the factor's credit service alone.

Sometimes a bank will handle mortgage financing, while the factor provides current financing. A factor may also invite the bank's participation in financing a client beyond the receivables, with bank loans against inventory or on open lines.

Finally, a hometown bank may find that requirements of a local client exceed its legal lending limit; the factor's participation may be more readily available or more desirable than that of another bank.

"Due From Factor"

To the banker who knows that the factor is a strong, reliable house and has no recourse on the client for collection of the receivables purchased, the "Due from Factor" item on the balance sheet is plainly a much sounder asset than the debts of hundreds or thousands of customers.

What does factoring cost?

The cost of factoring consists of interest for use of the factor's money, and a service fee which is a small percentage of the client's net sales.

For the money the client draws from the factor before maturity of the invoice involved, the factor charges interest until maturity date plus a nominal time for collection and clearance of checks. Thus the client pays interest to the factor only for the money he actually uses, and only for the days he uses it.

The service fee is negotiated in each case and depends on the client's volume, the type of customer sold, terms of sale, and the amount of bookkeeping the factor must perform in connection with the account. There are numerous offsets to this fee, such as the client's cost of operating a credit department of his own, loss of management time in credit and collection work, and losses due to bad debts. The cost of factoring on a per dollar per day basis, is thoroughly competitive with the cost of financing in any other segment of the money market.

Factoring may be regarded a technological instrument of money management, capable of bringing substantially increased profits. Firms should examine factoring carefully to see just what it can do for them.

Adhesives Anchor Lights To Airport's New Runway

Centerline of International Airport's new instrument runway is illuminated by pancake lighting system permanently fixed with an epoxy-based formulation

Recent use of a poly-plastic adhesive to anchor down the Port of New York Authority's "pancake" lighting system at its new 8400-foot instrument runway at New York International Airport has stirred interest in the possibility of similar applications at commercial airports throughout the nation.

The adhesive employed in the project was a viscous epoxy-based material designated as Permagile #10 and manufactured by Permagile Corporation of America, Woodside, N.Y. Until this year, its use had been largely in the field of maintenance and repair of concrete surfaces.

The lights are recessed in the runway where they serve to illuminate the centerline of its high speed exits. Experts have described the runway as the best illuminated in the world.

The epoxy bondant was chosen for the job after tests showed that it had the necessary strength and durability to withstand the tremendous impact of some of the 125-ton aircraft currently using the runway. In the installation, the adhesive was applied to the underside of each lighting fixture in approximately half-pound coatings. There are 225 such fixtures in all.

The runway was placed in service in mid-February, and reports since that time have confirmed the success of the lighting installation. It has stood up well under repeated freezing conditions and in times of snowfall took a considerable banging from snowplows without a single fixture being dislodged.

The epoxy compound used to cement down the flush centerline lighting is unaffected by aging or atmospheric conditions since it is impervious to temperatures between —20° and 270°F. In addition, it is said to be unharmed by alkalis or most acids and chemicals.

Tests have shown that the adhesive has an average compressive strength of 35,000 psi, tensile strength of 8-10,000 psi, and complete resistance to water pressure up to 30 psi. Its hardness is 30 Barcol, its water absorption only 0.12-0.13 per cent. Although extremely tough and rigid, it exhibits an elasticity 30 to 40 times that of normal concrete.

The flush centerline lights extend the full length of the runway and for a distance of 1000 feet into the center of the high speed taxiways. They are supplemented by two rows of runway edge lights also set flush with the surface of the runway so that aircraft can run over them without damage or danger. These edge lights are spaced 60 feet apart and extend 3000 feet down the runway. In addition the runway boasts elevated edge lights every 100 feet.

Snowplow tests a unit of the "pancake" lighting system recently installed on a new 8400-foot runway at N.Y. International Airport. A night view of the runway is shown above.

By JAMES M. MARGOLIS
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A Market Analysis of

Synthetic Resins for Coatings

Though during the 50's these plastics materials lost their leading position, the next decade should see them spurt ahead once more

A recent analysis of synthetic resins for coatings points to a break in the ten year plateau which has prevailed since 1950. Moreover, the resins shown to be largely responsible for the renewed growth of protective coatings are the epoxies, polyethylenes, polyvinyls and polyurethanes.

At one time, protective coatings resin production represented over 40 per cent of all plastics and resin production. In fact, coating resins maintained first place in volume over all other categories from the nineteen thirties, through the second world war and the expansive post-war years, up to 1950. This report is intended to analyze how a one-time "all-star" performer among plastics materials maintained its first place position for so many years, lost it in 1950, and can be expected to become a vigorous growth segment in plastics and resin markets again during the nineteen sixties.

Figure I illustrates the historic pattern established by synthetic resin protective coatings. In 1938, production of these resins accounted for 43 per cent of total synthetic resin production. As the total production grew, so did production of coating resins, and in 1949, coatings still were the largest volume user of resins and accounted for approximately 33 per cent of total production.

In the critical year of 1950, production for molding and extruding resins gained first place. The relative annual production for these two categories—molding and extruding resins, and coatings—through the 1950's is illustrated in Figure II. Molding resins kept moving ahead, gaining year after year, while coating resins, once they lost first place, showed virtually no change during this same period. At this time, one can rightfully ask "what is important about synthetic resins?"

Figure III, which resolves annual production of significant coating resins into separate groups, offers a clue to the answer to this question. Alkyd, styrene, urea, melamine, and phenol resins for coatings represent most of the total production during the 1950's. Rosin esters, included in the totals in Figures I and II, but not shown in Figure III, had an annual production of 74 million pounds in 1951 and 86 million pounds in 1959, with an annual average of 82 million pounds over that period.

Positive Slope

The curve for epoxies, vinyls, polyurethanes and polyethylene stands out as the only curve on Figure III with a positive continuing slope. It looks (on hindsight) as though the coatings industry was waiting for new resin types to meet the performance requirements of current times. The effect of these four resins combined on total production statistics over the past five years has been slight, because they represented a small fraction of the total: less than ten per cent in 1958, but an estimated 20 in 1960.

Current developments of these four resins as coatings offer no reason to expect their share of the total to halt at 20 per cent. In fact, they will probably take on a larger percentage in the coming years. As this happens, and their tonnage increases annually, their effect may start to show on total production figures by causing a break in the ten year plateau since 1950.

The figures in Figures I through IV are based primarily on United States Department of Commerce Tariff Commission reports. There are certain assumptions and estimates incorporated in our use of these figures. These are being refined in a current nationwide field survey of synthetic resin protective coatings which our company is conducting. However, enough information has been compiled and correlated to believe this forecast for polyethylene, polyurethane, epoxy and vinyl coatings is neither unduly optimistic nor unrealistic. Before reviewing a few details in the statistics upon which our analysis is based, let us look at current market developments which have been singled out as the areas in which these four resins are most likely to gain increased sales volumes during the 1960's.

Generally speaking, protective coatings are rated according to properties including adhesion, durability, resistance to chemicals, corrosion, abrasion, their ease of application and economics. Polyurethanes, which have enjoyed a European market for the past five years are being accepted in this country to a greater degree for coating wooden, metal and concrete surfaces. Furniture and radio or TV cabinets are end-use examples.

Polyurethanes, two component systems comprised of polyesters and isocyanates, are attractive because of the wide range of coating types possible by changing the ratios of these two components, illustrated by other end-use applications including computing machine coatings, automotive coatings for dashboards and certain auto body parts, floor coatings, and electronic coatings. The wide range of applications puts polyurethanes in competition with epoxies and vinyls in a number of uses.

Epoxy resin coatings will probably

find their market potentials during the next ten years in three areas: in building, electronics and highway applications. Lower cost sand-filled and bituminous epoxy coating materials are opening large volume coating applications, particularly on concrete surfaces, but also on wooden furniture and metal drums and containers. The development of better clarity and assortment of light and dark colored materials will be another factor in epoxies' increased use during the next ten years as a coating material.

Contributing to Growth

The automotive, electronic, appliance and building industries are also expected to contribute to a faster growth of vinyl coatings during the next ten years than was recorded during the past five years. Apart from increased growth in these four end-use industries themselves, certain key applications have been selected in this study as most likely to augment vinyl coating sales during the nineteen sixties.

Vinyl coatings applied as plastisols are being used more and more on metal surfaces to coat electronic equipment, business machines, furniture and materials for building construction. Vinyl coatings may also find additional market outlets on masonry and concrete blocks in the building industry. Applied as hot melts, vinyls can be employed for temporary surface protection of parts during assembly or in transit.

Polyethylene coatings, on the other hand, are looking to the packaging industry, largely, for future gains. Polyethylene is now often extruded on to paperboard or applied as a melt. Polyethylene in powder form was recently introduced into the United States and could receive significant acceptance for coating metal drums as well as glass. In the packaging industry, treated materials are reportedly becoming a trend. Along these lines, polyethylene can look for markets as surface treating material for flexible films and paper containers as well as applications already cited.

Companies Involved

The number of companies with a stake in these developments are too numerous to list. They include major resin manufacturers such as Allied Chemical Corp., American Cyanamid Co., E. I. duPont de Nemours and Co., Goodrich Chemical Co., Monsanto Chemical Co., Rohm and Haas Co., to name only a few.

Protective coatings maintained a prominent position during the war years due to a strong demand for all types of alkyd resins to meet weather and temperature requirements of the military. The statistics during the period 1941-1945 can not be logically correlated to current figures because of raw material shortages and mili-

Figure 1—Resin Production Breakdown

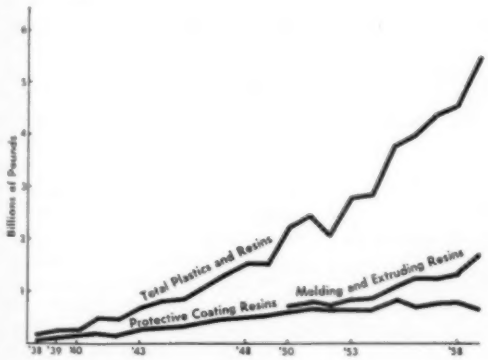


Figure 2—Coating Vs. Molding Resins

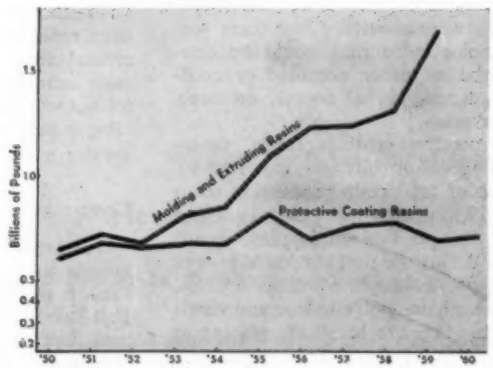


Figure 3—Protective Coating Resins

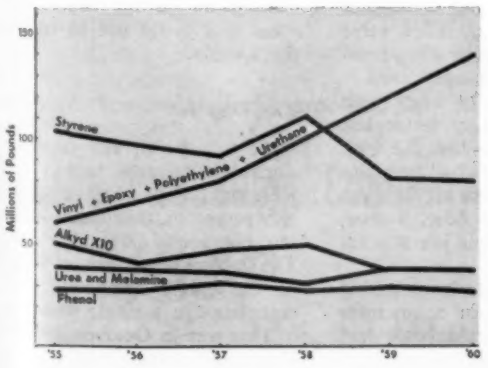
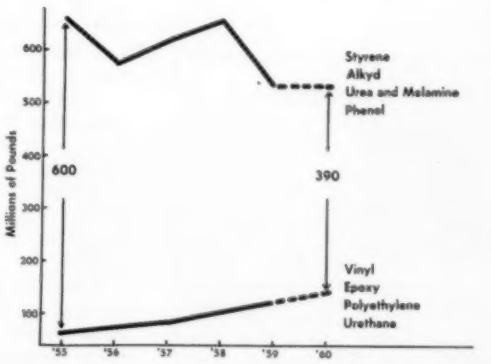


Figure 4—"New" Vs. "Old" Resins



tary requirements have been replaced by consumer demands and available new materials today. However, the statistics are useful in showing where today's widely used coating resins got their real beginning. Moreover, a number of changes in classification of reported plastics materials have taken place since the middle of the 1940's.

For example, in the early years, statistics for protective coatings were reported as a single group, while today separate figures are reported for phenolics, urea and melamine, styrene, and alkyds. Although production figures have been chosen for our statistical analysis, vinyl resins sales figures have been included. However, these figures have been totalled in with other resins.

Totals Unaltered

The sales figures for vinyls will not alter total coating tonnages because vinyls amount to only about 25 million pounds of totals, amounting to over 600 million pounds per year. Molding and extruding polyethylene resins were based on polyethylene used in film and sheeting, molded articles and pipe. Wire and cable resins were omitted where there was a choice since they could be considered as either extruded or coating, depending, of course, on one's orientation.

Protective coatings resins, representing about thirty-five per cent or more of total resin production from the 1930's up to 1950, plateaued and lost their position among plastics end-uses during the past ten years. Newer resins for coatings, especially epoxies, polyurethane, polyethylene and vinyls are predicted to break this plateau in the early 1960's and show renewed increases in protective coatings' annual production statistics.

About the Author . . .

J. M. MARGOLIS founded Chemical Marketing & Research Co. in 1958. The firm specializes in market development in the polymer field. After graduating from M.I.T. in 1952, Mr. Margolis went to work as a research chemist for Dewey & Almy Chemical Co.

Finger Painting with epoxies

In converting a million-gallon tank for use in pressure-type storage contractors use a metallic epoxy resin compound to "paint" each rivet

A one-million gallon tank used to store hexane under pressure has been rendered leak-tight by caulking critical areas with a metallic epoxy resin compound. In the course of the job some 8400 individual rivets were "finger painted" with the plastic cement.

Converting Tank

The tank, measuring 66 feet in diameter by 42.9 feet in height, is a facility of the Fall River Gas Co., Fall River, Mass. It was built in 1942 and had not previously required large-scale maintenance. In 1959, however, the tank was converted to pressure-type storage to permit its use for storing hexane. The venting system was changed and a breather set-up installed with a relief valve to permit escape of vapor when pressure increased to the danger point.

Before the tank was filled with hexane, a precautionary water test was run. It was found that the tank leaked. Since the low boiling point of hexane makes it one of the most difficult substances to store, a thorough and careful repair job was required.

Fall River Gas began investigating the use of epoxy resin compounds when it was learned that they had been used successfully in repairing large storage tanks in other localities. The epoxy resin aluminum formulation selected for the job was one commercially designated as Metalset A-4, a product of Smooth-On Mfg. Co., Jersey City, N. J. Actual application was assigned to National Contracting Co., Fall River.

Before applying the epoxy cement, the contractor sandblasted the critical areas where it was to be used. This included approximately 2000 linear feet along both vertical and horizontal seams and the areas around the rivets to be sealed.

When the sandblasting was completed, an ordinary spatula was first used to apply the epoxy compound. However, it soon became obvious that to seal the rivets completely without overlooking even minute areas, some means would have to be devised for getting the epoxy into areas that could not be reached by the spatula.

Two-Day Job

At this point, the crew of National Contracting took to "finger painting." With their fingers properly protected, they carefully applied the compound around each rivet. The job required about 40 gallons of the epoxy compound and was completed in a single weekend.

This was in October, 1959. As of nine months later, and after a particularly severe winter, no leaks were reported.

ADHESIVES GUIDE

by JOYCE HURD

• A Practical Handbook

designed to serve as a guide to the types of adhesives available for bonding various materials in various applications. This new British publication covers adhesives used in woodworking, bookbinding, footwear, etc., and offers valuable data on the advantages of adhesive bonding and the classification of adhesives.

Topics Covered

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Encyclopedia of Basic Adhesive Types.

Classification of Manufacturers (British) by Basic Types of Adhesives Made

Catalog of Adhesive Manufacturers and Their Products

Trade Name Index (British)

Miscellaneous Adhesive Recipes

British Organizations Concerned With Adhesives

Bibliography

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NEWS of the ADHESIVES WORLD

ASTM C-19 and D-25 Report on Tests

The Amercian Society for Testing Materials, Philadelphia, Penna., has issued reports on the year's work done by Committee C-19 on Structural Sandwich Constructions, and Committee D-25 on Casein and Similar Protein Materials. In its report of its meeting on April 26 and 27, Committee C-19 stated that the use of sandwich construction in jet-powered aircraft and missiles has resulted in the need for a new set of standards for evaluating the properties which become critical under the extreme conditions encountered. The need for measuring internal friction and fatigue strength of core materials, sonic fatigue properties of constructions, and the use of micro-lightweight sandwich construction for solar work are in this category. The committee also reviewed apparatus for measuring internal friction and fatigue strength of core materials used in sandwich construction.

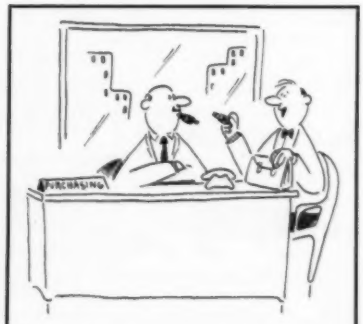
Measuring Peel Strength

Testing procedures for measuring peel strength, which has been a very difficult field to develop, were again reviewed, including the Martin and Hexcel methods. A recommended practice for testing at high or low temperatures will again become a project for development of a standard, the committee states.

In lieu of the increased emphasis on the development of standards needed in the building construction field, C-19 also discussed such topics as non-destructive testing, accelerated aging tests on building panels, and test methods for determining shear properties, modulus of elasticity in bending, and modulus of rigidity in bending of corrugated-faced building panels with foamed cores.

ASTM Committee D-25 submitted several methods of tests relating to casein and isolated soy protein to ASTM for adoption at the society's Annual Meeting, June 26 to July 1, 1960, at Atlantic City, N.J. The methods provide for the determining of ash content, alkali requirements, free acidity, moisture, nitrogen, and oil. A related method on the sampling of casein and similar protein materials was adopted at last year's meeting.

About 30 organizations representing the adhesives, paper coating, paint, and leather industries have participated in the development of these standards which satisfy a demand from the casein industry to unify and standardize methods used in foreign and domestic commerce. Other work under consideration by the committee includes methods for determining dirt content, foaming characteristics, insoluble matter, minimum alkali content, odor, and tests for the materials when used for paper coating. Additional studies still underway apply to methods for measuring the viscosity of casein and soy protein solutions.



"The application of this new adhesive in stick form is really quite simple. First, you chew all the sugar out of out . . ."

3M Negotiating To Buy Drug Firm

Minnesota Mining & Manufacturing Co., St. Paul, Minn., and Warner-Lambert Pharmaceutical Co., Morris Plains, N. J., are engaged in negotiations for the purpose of combining the two companies. William L. McKnight, 3M board chairman, and Elmer H. Bobst, Warner-Lambert chairman, emphasized that further discussion of details and subsequent approval by the respective boards of directors and stockholders of the two firms will be necessary before any combination can be achieved.

Stock Exchange

The two companies report that in the event present plans, after further investigation, are finalized and approved, 3M will issue one-half share of its common stock and one share of a special Class "A" voting stock to be authorized by its stockholders, for each share of the common stock of Warner-Lambert. The purpose of the Class "A" stock is to provide a means for paying to the Warner-Lambert stockholders a dividend return from the combined company equal to that which he probably would have received in 1960. The annual dividend on the Class "A" stock will be $1.35 per share unless there is a reduction in the dividend paid on 3M common stock. In that case, the dividend on the Class "A" stock will be reduced proportionately.

The Class "A" stock may be converted at any time at the option of the Class "A" stockholder into three-fifths of a share of 3M common stock, but it cannot be called until five years after its issue. During the succeeding five-year period, it may be called at 3M's election in whole or in part at $80 per share. At any

time after the tenth year, 3M may elect to require the holders of the Class "A" stock to convert to common on the basis of three-fifths of a share of common stock for each share of Class "A" stock.

According to the companies, there is no way of estimating at this time the total dollar amount which might be involved. However, Warner-Lambert has approximately 5,260,000 common shares outstanding. If all of the proposed Class "A" shares were eventually converted, the total number of 3M common shares involved in the transaction would be approximately 5,780,000. In recent weeks, 3M common has traded in the $70 to $75 range.

The combined sales volume of the two firms exceeded $690,000,000 in 1959. The world-wide volume of 3M was $500,000,000 with net income of $63,500,000. Warner-Lambert's 1959 sales were over $190,000,000 with earnings of $16,400,000.

Messrs. McKnight and Bobst, in outlining the tentative plans for the proposed action, stated that since 3M is well known for its extensive and diversified research activities, it is expected that some phases of this research will lead to development of chemicals and other products which may in the future find use in the field of medicine and pharmacy. The Warner-Lambert activities are diversified as to product lines, but major research and marketing stress is on the development and promotion of ethical and proprietary pharmaceuticals.

Each company has world-wide centers of production and distribution and the record of each concern is one of dynamic growth, they added. Since the managements of the two companies have similar thoughts regarding basic and developmental research and progessive marketing programs, there is strong reason to believe that a combination of the two firms would prove to be advantageous to the stockholders and employees of both companies and to the public. According to the joint statement, Warner-Lambert will retain its full identity and operating autonomy.

New Metachem Division

Metachem Resins Corp., Cranston, R.I., has formed a new division called the Mereco Products Division. Mereco will handle all Metachem epoxy and other allied compounded resin products for use by the electrical and electronic industries.

Glisson Wilson

Jack Barker

Albert R. Splet

Three Appointed By Pecora

Pecora, Inc., Philadelphia, Penna. has appointed Glisson Wilson as its Garland, Texas, operation branch manager, Jack Barker as sales representative for the Texas-Louisiana territory, and Albert R. Splet as its regional sales manager for the midwestern territory. Mr. Wilson, active in the building construction field for over 30 years, formerly was the sales representative for Pecora in the Dallas, Texas, area.

Mr. Barker, in his new position, will be responsible for servicing all sales contacts in that area and will endeavor to open new channels of distribution for Pecora products. Previously he had been on the southwest public relations staff for Pecora since the Garland, Texas, plant went into operation. Mr. Splet was formerly with the National Lead Co., for a period of 25 years and has acquired a broad knowledge of the building industry from his many experiences.

ADM Allots $26 Million

Archer-Daniels-Midland Co., Minneapolis, Minn., has appropriated $26 million for investment in new plants, products, and equipment in the next two years. John H. Daniels, president of ADM, reports that the company's directors have approved a budget in excess of $11 million—highest in ADM's history—for the current year. He states that an estimated $15 million will be spent in the 1961-1962 fiscal year. These increased budgets compare with $4 million for the past year.

Eighty per cent of the planned $26 million spending for capital improvements will go for new plants and new products, according to the ADM president, and to expand production and increase efficiency in the company's more than 100 plants, elevators and mines located throughout the United States.

ADM reports that it will shortly announce the results of its 1959-1960 operations. Earnings for that period are expected to be below the previous year—a major reason why the company is concentrating on a profit improvement program, states Mr. Daniels. A key item in the ADM plan is the construction of a new multi-million dollar chemical center at Peoria, Ill. The plant is scheduled for completion in 1962. Mr. Daniels points out that this expansion in chemicals underscores ADM's program to emphasize operations with greater financial return on investment.

Fuller Moves Office

H. B. Fuller Co., St. Paul, Minn., has moved into a new office building at 1150 Eustis Street in St. Paul. Construction of the building which houses both offices of the parent company and its manufacturing subsidiary, H. B. Fuller Co. of Minnesota, was begun last Fall. The former home office, located at 255 Eagle Street in St. Paul, is being converted to expanded research and development facilities will be ready in the near future.

Issues Market Report On Resin Coatings

Synthetic resin protective coatings, including alkyds, urea and melamine, phenolics, polystyrene, vinyls, polyurethanes, polyethylene, epoxies and also polyamides and fluoroethylene could break one billion pounds by 1965, forecasts James M. Margolis, of Chemical Marketing & Research Co., New York, N.Y. This forecast is based on the findings and analyses in a multiple sponsored survey of protective coatings in major consuming industries.

According to Mr. Margolis, there are three factors which make the predicted tonnage plausible: one, an empirical graphic analysis based on production for the past 20 years. This yields a production of 768 million pounds for 1960, and for 1965, 825 million pounds. Then evaluate this purely graphical projection on the basis of growth of major consuming industries which include construction, transportation, home appliances, electrical and electronic, furniture, packaging, and office equipment; finally, add to the evaluation marketing and technological developments influencing resin coating production for these major end uses. A thoroughly accurate evaluation would, ideally, close the gap between the statistically empirical figure of 825 million pounds and the one billion pounds proposed.

Mr. Margolis states that the acceptance of several newer coating resins, in the past five years, such as polyurethanes for electrical, industrial, construction, transportation and furniture application will contibute significantly during the next five years. He points out that in packaging there is a rapidly increasing use of polyethylene for coating paper packages which is certain to contribute to the billion pound level. In addition, the choice of appliance enamels—alkyds, acrylics or epoxies, or vinyl coatings—may undergo radical changes if colored kitchen appliances finally become widely accepted by the consumer.

Besides anticipating a 30 per cent increase in synthetic resin protective coating production by 1965, Mr. Margolis states that it looks as if there is also going to be a shift in importance among the types of resins in use today. Mr. Margolis' remarks were based on a 150-page report being offered by the Chemical Marketing & Research Co.

The company is also offering a 30-page report on plastics in medicine and dentistry. According to Mr. Margolis, this survey has revealed that these professions provide a market potential which has generally been underestimated. The report contains data on surgical sutures, hypodermic syringes, artificial teeth, and surgical tape. Mr. Margolis states that sutures, syringes, teeth, and surgical tape made out of plastics represent a production value of more than 25 million dollars. He explains that the purpose of the statistics is to point out that plastics medical and dental end products have a high dollar value worthy of many plastics manufacturers' sales efforts and may be a "sleeper" among plastics end-use items.

James M. Margolis

FDA Amends List

The Food & Drug Administration has made a number of corrections in its list of substances migrating from adhesives used in food packaging. The products have been granted additional time for testing to comply with the tolerance provisions of the food additives law. The corrections are for the purpose of replacing trade with chemical names.

Deleted from the list were the following chemicals. butyl carbitol acetate; butyl cellosolve; carbitol; carbitol acetate; cellosolve; cellosolve acetate; methyl carbitol; and methyl cellosolve.

Chemicals added to the FDA list were: diethylene glycol monobutyl ether acetate; ethylene glycol monobutyl ether; diethylene glycol monoethyl ether; diethylene glycol monoethyl ether acetate; ethylene glycol monoethyl ether; ethylene glycol monoethyl ether acetate; diethylene glycol monomethyl ether; and ethylene glycol monomethyl ether.

Resin Production Up 30 Per Cent In 1959

A preliminary report from the U.S. Tariff Commission reveals that plastic and resin material production, excluding cellulosics, increased by 30 per cent in 1959 to 5,860 million pounds. Production of all cellulosic plastics in 1959 amounted to 158 million pounds. Plastic and resin sales in 1959 amounted to 5,166 million pounds, valued at $1,639 million, compared with 4,057 million pounds, valued at $1,275 million in 1958.

Tops in volume were vinyl and vinyl copolymer resins and polyethylene resins. Vinyl resins output in 1959 was 1,166 million pounds, compared with 869 million pounds produced the previous year. Sales of vinyl resins in 1959 totaled 1,102 million pounds, valued at $340 million, compared with the 1958 figures of 829 million pounds, valued at $266 million.

Polyethylene Output

The 1959 output of polyethylene resins was 1,195 million pounds, compared with 865 million pounds in 1958. Total 1959 sales of polyethylene resins reached 1,116 million pounds, valued at $355 million, compared with 845 million pounds, which was valued at $270 million in 1958.

The output of phenolic and other tar acid resins in 1959 amounted to 625 million pounds, compared to the 488 million pounds reported for 1958. Sales of these resins in 1959 totaled 555 million pounds, valued at $154 million, compared with the 1958 figures of 440 million pounds, valued at $117 million.

In 1959, production of urea and melamine resins rose to 421 million pounds. Sales in 1959 amounted to 384 million pounds, valued at $115 million, compared with 326 million pounds, valued at $97 million in 1958.

The preliminary report of the Tariff Commission includes statistics on acrylic, alkyd, epichlorohydrin, and polyester resins. Complete statistics will be given in the commission's final report on production and sales of synthetic organic chemicals in 1959, which will be issued later this year. Copies of the preliminary report on production and sales of synthetic plastics and resin materials can be obtained from the U.S. Tariff Commission, Washington 25, D.C.

Wisconsin Planning Adhesives Symposium

The University of Wisconsin Extension Division, in cooperation with the College of Engineering, will be conducting its second annual engineering institute on Industrial Adhesives Applications on October 25 and 26 at the Wisconsin Center Building, University of Wisconsin, Madison, Wisc. The two-day program will consist of three panel discussions—Industrial Adhesives, Structural Adhesives, and Equipment Used for Adhesive Binding. Five topics are planned for the Industrial Adhesives panel discussion, they are: automotive industry; paper and packaging industry; housing industry; shoe and leather goods industry; and bookbinding industry.

The topics for the Structural Adhesive panel discussion are: structural laminations; curtain wall construction; metal assemblies, and particle board binders. Three topics—spreaders, presses, and high frequency curing—make up the panel discussion on Equipment Used for Adhesive Binding.

The fee for the two-day meeting will be $25. Additional information concerning the Industrial Adhesives Applications Institute can be obtained from Richard A. McCormick, Institute Coordinator, Department of Engineering, University Extension Division, University of Wisconsin, Madison 6, Wisc.

Morningstar-Paisley Plant Opens

Production of a complete line of industrial adhesives has begun at the new Atlanta, Ga., plant of Morningstar-Paisley, Inc., New York, N.Y. The new plant will also serve as a warehousing and service facility for other M-P products, such as textile, paper and food starches, water soluble gums, polyvinyl acetate resins, and plastisols. The Atlanta operation is the 15th plant in the company's string of coast-to-coast processing facilities.

According to Murray Stempel, president of M-P, "location of the new plant reflects the growth and diversification of southern industry and the increasing need for adhesives, starches, dextrines, processed gums, and specialty chemicals in this important area. Since our company emphasizes technical service, the need for proximity to our customers is vital. A team of specialists in all fields where adhesives are used will be on hand to tackle technical problems. Initial capacity of the plant is set at 12 million pounds of liquid adhesives."

The Atlanta plant will produce adhesives based on vegetable, animal, synthetic resin and latex materials, and will be custom-formulated for packaging operation and the manufacture of bags, envelopes, paper products, footwear and wood products, according to a Morningstar-Paisley release.

The company has anounced that the plant personnel will include Lee Kritzer, regional manager, and Milton F. Lenz, production manager, assisted by a team of technical specialists.

Thiokol Sales Up

Thiokol Chemical Corp., Trenton, N.J. reports that for the six months ended June 30, 1960, its net sales totaled $83,361,675, up 3 per cent from the 1959 six-month figure of $80,735,952. Net earning after taxes for the 1960 period amounted to $1,736,648, 39 per cent lower than the previous year's six-month earnings of $2,868,568. Earnings per share for the 1960 period were 38¢, compared to 64¢ for the like period a year ago. According to the company, during the first six months of 1960, a considerable portion of sales from rocket operations were applicable to non-fee bearing contract overrun costs. The problems causing these added costs now appear to be substantially under control, the company states.

Sales from Chemical Operations were 27 per cent below those for the first six months of 1959, due principally to reduced sales to the company's Rocket Divisions. Chemical sales forecasted for the balance of this year indicate significant improvement over the first six months, Thiokol states. In addition, notwithstanding the improvement in profits expected during the last six months, the net income for the year 1960 is not anticipated to equal that of last year.

Plans Expansion Program

Adhesive Products Corp., New York, N.Y., has announced plans for a $5 million expansion program. According to M. P. Medwick, president of Adhesive Products, the first stage in the program is the construction of a 23,000 square foot steel and concrete addition to its present plant. When completed, this fully automated, fire-proof plant will produce Visopex, a new polymer developed by the company which incorporates the most outstanding features of rubber, epoxy resins and polyvinyl acetate, Mr. Medwick states.

The second phase of the expansion program, Mr. Medwick adds, will be the construction of a 46,000 square foot plant, scheduled to get underway early in 1961. Mr. Medwick indicates that the company plans to add 20 or more chemists and chemical engineers to its staff and to put up additional plants in southern and western locations.

This year marks the celebration of Adhesive Products 65th year as a major producer of latex cements, rubber cements, impregnating compounds, molding latex, and a wide variety of industrial coatings and sealing compounds, notes Mr. Medwick.

Dr. H. M. Sonnichsen

Joins Dewey & Almy

Dr. Harold M. Sonnichsen has joined Dewey and Almy Chemical Division, W. R. Grace & Co., Cambridge, Mass., as director of fiber and saturant research in the Polyfibron Division. He previously was a vice-president and research director of the Permacel Division, Johnson and Johnson. In his new post, Dr. Sonnichsen will be responsible for developing improved fiber webs and the resins with which they are impregnated in support of all Dewey and Almy polymer-fiber product lines.

Dr. Sonnichsen graduated from the Texas College of Mines in 1934. He received his M.S. degree in industrial chemistry in 1935, and his Ph.D. in organic chemistry in 1939 from Harvard University. Prior to his 16 years with Permacel, he was associated with the Electrochemicals Department of DuPont. Dr. Sonnichsen is a member of the American Chemical Society, American Association for the Advancement of Science, American Institute of Chemists, American Society for Testing Materials, Association of Research Directors, New York Academy of Science, and the Chemist's Club.

Colton Names Cummins

Colton Chemical Co., Cleveland, Ohio, has appointed Michael J. Cummins as its sales representative for the territory of eastern Ohio, western Pennsylvania, western New York, and West Virginia. He will maintain his headquarters in Cleveland, Ohio. Mr. Cummins, who received a B.A. degree in chemistry from Kent State University in 1957, previously was associated with Ohio Sanitation Co.

Develops Tylac Latex

A modified butadiene-styrene latex of the self-curing type, designed for paper, textiles, non-woven fabric, leather finishing, and dipped goods applications, has been developed by International Latex Corp., Dover, Del. Of the 20 commercial Tylacs developed, nine are tailor-made for the paper industry. According to International Latex, these show good affinity for cellulose along with a host of other desirable properties. Commercial papers saturated with these emulsion polymers, the company adds, show high internal bond, improved wet strength, high elongation, good tensile strength, and resistance to oils, grease, and solvents. Such papers go into masking-tape backing, labels, decorative papers, and other uses that involve pressure-sensitive adhesives, the company states.

FMC Seeks Oxiron Uses

End-uses for the recently developed Oxiron family of epoxy resins are being explored by a newly-formed application group at the Princeton, N. J., research and development center of Food Machinery & Chemical Corp., New York, N. Y. The new research team is concentrating its efforts in four general application areas—laminates, castings, adhesives, and surface coatings. Special attention is being given to a broad range of curing systems and to high temperature properties of the cured resins in these fields of use. An additional area of research is devoted to development of new materials in these fields. The group is also responsible for technical service to companies which are evaluating the resins for specific uses.

MCA Schedules Meeting

The 10th Semi-Annual Meeting and Mid-Year Conference of the Manufacturing Chemists' Association will be held on November 22, 1960, at the Statler-Hilton Hotel in New York City. A day-long series of panel discussion on subjects of interest to the chemical industry will begin at 10 a.m. The meeting will be concluded with a reception and banquet that evening. According to MCA, the sessions are designed to orient executive and staff personnel of MCA member firms with current trends in the chemical industry. Over 1,000 persons attended the 1959 meeting.

Thomas B. Porter

Joins Armour Adhesives

Thomas B. Porter has joined the Adhesive Division of Armour Alliance Industries, Alliance, Ohio, as a sales representative working out of the firm's Philadelphia, Penna., sales office. Mr. Porter, formerly an industrial sales representative for Armstrong Cork Co., will be responsible for the sales activities of Armour's complete line of resin, animal-base, and blood adhesives. He will begin his duties upon completion of Armour's adhesives sales training program. Mr. Porter is a graduate of the University of Virginia, where he received a B.A. degree. He served in the U.S. Navy as a gunnery officer during the Korean conflict.

G-E Develops Repellant

A new air curing silicone water repellent, designed to provide improved durable water and weather resistance for leather, paper and paperboard products, has been developed by the Silicone Products Department of General Electric Co., Waterford, N.Y. Designated SS-4024, the new material is said to act without catalysis or thermal cure and can be applied by spraying, brushing, swabbing, dip and roll coating without any provision for heat after application. It is ideally suited for packaging in aerosol spray cans for consumer application, the company states. In addition, the new material not only imparts durable water repellency to leather but allows unimpaired air circulation through the treated material. G-E claims that SS-4024 has low temperature flexibility and resists oils, greases and alkali salts.

Armstrong Unit Moving

The Industrial Division of Armstrong Cork Co., Lancaster, Penna., will relocate its New York City sales offices to Rockefeller Center in New York City early in 1961. The company's other New York City sales and showroom facilities will also move to the new location at 60 West 49th Street. A ground-floor showroom in the same building, to be designed as a consumer-decorator exhibit hall, will feature the newest product developments of Armstrong's Floor and Building Products Divisions. The firm's New York City offices are presently located in the Textile Building, 295 Fifth Avenue, and will be vacated at the close of 1960.

On the financial scene, Armstrong reports a net profit of $8,960,000, or $1.71 a common share, for the first six months of 1960. This compares with $9,928,000, or $1.91 a common share, for the like period of 1959. Estimated sales for the 1960 period amounted to $145,167,000, up from the $142,295,000 in the first half of 1959. Capital expenditures in the first six months of this year totaled $11,440,000, compared with $7,059,000 in the same period a year ago.

Borden Appoints Four

Borden Chemical Co., New York, N.Y., has announced four sales appointments, three on the West Coast and the other in New England. Appointed district managers for the Western Operations Department were John W. Runkel, Francis W. Linehan, and Benjamin B. Butler. Alvin E. Jerome was named sales representative for the Polyco-Monomer Department.

Mr. Runkel, formerly plywood sales manager for the Western Operations Division, will be responsible for the sale and manufacturing activities of the company's products in Oregon, southern Idaho and Wyoming. Mr. Lineham, previously sales manager for the division, will handle the firm's products in Washington and Canada areas.

Mr. Butler, previously serving Borden as a chemical engineer for research and development, will be responsible for all sales and manufacturing in the California area. Mr. Jerome, with Borden since 1958, will be responsible for the sale of Polyco-Monomer's full line to the adhesive, paint, paper, leather, packaging and textile industries in the New England states.

Chem Seal Distributors

Chem Seal Corp., Los Angeles, Calif., has appointed new distributorships in five areas as part of an expanded national distribution program for its industrial products. The new distributors are: Crenshaw Supply Co., Jacksonville, Fla., and Atlanta, Ga.; Conrad Sovig Co., San Francisco, Calif.; Darragh Co., Little Rock, Ark.; and Southwestern Explosives & Supply Co., Midland, Texas. According to Chem Seal, the distributing firms will handle its line of adhesives, sealants, and polysulfide and epoxy coatings, calling on architects, contractors and dealers.

Resin Unit In Portugal

Two Japanese firms, Shinetsu Chemical Industry Co., and Mitsui Bassan Co., plan to build a plant in Portugal for the production of synthetic resins. According to reports, the two Japanese firms will work with two Lisbon companies, Uniao Electrica Portuguesa SARL, and Banco Pinto & Sotto Mayor. The new company will be called the Companhia Industrial de Resinas Sinteticas SARL. It will be capitalized at 50 million escudos ($1.75 million), and have a capacity of 3,600 tons a year.

Resin Plant On Stream

A new plant producing urea and phenol-formaldehyde resins has been put on stream in Conway, N.C., by National Polychemicals, Inc., Wilmington, Mass. The new unit is under the direction of L. F. Bornstein, vice-president in charge of the firm's Synthetic Resin Division. According to the company, the new plant will supply resins to customers in the South. National Polychemicals reports that it has expanded its Wilmington facilities to take care of needed increased production of resins in New England.

3M Sales Up

Minnesota Mining & Mfg. Co., St. Paul, Minn., reports that its sales for the six-month period ending June 30 totaled $263,013,173, compared with $237,358,645 in the first half of 1959. Consolidated net income for the 1960 period was $32,366,002, or 63¢ per share of common stock, compared with $29,597,074, equal to 58¢ per share in the same period a year ago. Sales in the second quarter of 1960 were $134,343,955 and earnings were $16,148,091, or 32¢ per share of common stock. In the same period of 1959, sales were $122,186,325, with earnings at $15,640,554, or 31¢ per share. All 1959 figures have been restated to reflect the three-for-one stock split of May 1960, and to include 3M foreign operations, which, except for Canadian and export, were not included in prior years.

C-19 and D-25 Officers

New officers have been elected to serve for two years by Committee C-19 on Structural Sandwich Constructions, and Committee D-25 on Casein and Similar Protein Materials, of the American Society for Testing Materials, Philadelphia, Penna. The Committee C-19 officers are: *Chairman,* S. Yurenka (Narmco Industries); *Vice-Chairman,* E. W. Kuenzi (Forest Products Laboratory); *Secretary,* J. P. Reese (Martin Co.); *Membership Secretary,* Walter Lovett (Pittsburgh Corning).

L. E. Clark, Jr., (Perkins Glue) was elected chairman of Committee D-25, succeeding H. W. Shader (Armstrong Cork). Mr. Clark had been vice-chairman of the committee. L. E. Georgevits (Borden Chemical) is secretary of the committee.

Micarta Expanding

Micarta Division, Westinghouse Electric Corp., Hampton, S.C., is expanding its facilities for manufacturing high pressure decorative plastic laminate by 75 per cent. The expansion program, the company states, will add new equipment and 40,000 square feet of new manufacturing space to the Micarta plant which presently comprises 540,000 square feet. The expansion is scheduled for completion in late-1961. In addition to decorative products, the Micarta Division manufactures a wide variety of plastic laminate and polyester products for industrial use.

Anthony Latona

Named Manager

Anthony Latona, senior product engineer in the Adhesive Division of B. F. Goodrich Industrial Products Co., Akron, Ohio, has been appointed manager of the division's latex and plastisol compounding and development laboratory. Mr. Latona holds a B.A. degree in chemistry from Wooster College and his graduate work in bio-chemistry at Ohio State University. He joined Goodrich as a materials engineer in 1952, after serving a year as a chemist with the Ohio Agricultural Experiment Station at Wooster. Mr. Latona has held engineering posts in Goodrich's chemistry laboratory and rubber reclaiming plants.

CoRezyn Foam Systems

Commercial Resins Corp., St. Paul, Minn., has developed a new rigid urethane foam system using its CoRezyn PEF-2000 and PEF-2003 materials. PEF-2000 is a polyether resin prepolymer, and PEF-2003 is a catalyst-propellant mixture. The propellant is trichlorofluoromethane. The company reports that the foams produced by reacting the proper proportions of PEF-2000 and 2003 are closed-cell foams, which suggests its use as flotation for boats, insulation for building and architectural uses, insulation for appliances, packaging materials, and other products. According to the company, these materials can be foamed-in-place, thus eliminating waste in trimming slab stock. Since many uses require a two pound density foam, a prepared formulation of PEF-2000 and PEF-2003 need only be mixed as directed with no other materials required, the company states.

Reichhold On Move

Reichhold Chemicals, Inc., White Plains, N.Y., has signed a license agreement with Compania BAO, S.A., Montevideo, Uruguay, for the manufacture of resins for use in the surface coating, adhesive, bonding, laminating, and polyester industries of Uruguay. Reichhold reports that Compania BOA would market these resins under RCI's trade marks.

RCI and Nicolet Industries, Inc., have jointly announced that, under the terms of an agreement between the two firms, control of Modiglass Fibers, Inc., has passed from Nicolet to Reichhold. Modiglass Fibers, a manufacturer of glass fibers and glass fiber mats for the reinforced plastic and other industries, has a plant and general sales office in Bremen, Ohio.

Reichhold also reports that it has begun construction on a 25-million-pound-per-year phenolic molding compound unit at Carteret, N.J. This will be RCI's 24th domestic plant. Other plants, for the production of a variety of chemicals, will be constructed at the same site—40 acres of waterfront property—in the future, Reichhold states. The phenolic plant now under construction is scheduled to be completed in the Spring of 1961.

Mid-States Names Three

Mid-States Gummed Paper Division of Minnesota Mining & Mfg. Co., Bedford Park, Ill., has appointed three new regional sales representatives for the southern and eastern sections of the United States. John E. Mines, a seven-year veteran of sales with the 3M company, will handle Mid-States sales in the southeastern sections of the United States. His headquarters will be in Atlanta, Ga., and his territory will include Georgia, Florida, Alabama, Mississippi, Louisiana and central Tennessee.

Dudley H. Price, a 3M sales representative for 10 years, will be headquartered in High Point, N.C., and his territory will include Virginia, North Carolina, South Carolina and the eastern section of Tennessee. Edward R. Gallagher, formerly a member of the Mid-States' Customer Service Department, has been assigned to the 3M Philadelphia, Penna., office and will handle sales in association with John Attaway, in the eastern portion of Pennsylvania, parts of New Jersey, Delaware and Maryland.

Lee E. Sherrick

Stein, Hall Manager

Stein, Hall & Co., Inc., New York, N.Y., has appointed Lee E. Sherrick as southern adhesive manager. Mr. Sherrick, with headquarters in the firm's Charlotte, N.C., factory where its southern adhesive technical service is maintained, will coordinate Stein, Hall's adhesive sales program in North and South Carolina, Virginia, Georgia, Mississippi, Florida, Louisiana, Alabama, and a portion of Tennessee. Mr. Sherrick joined the Charlotte office of Stein, Hall in 1946. He has been a sales representative for the firm's industrial adhesives since 1952.

Enjay Names Miller

G. W. Miller has been named assistant manager of the new Plastics and Resins Division of Enjay Chemical Co, New York, N.Y. He previously had been responsible for product management functions for Buton resins. A graduate of Carnegie Institute of Technology, Mr. Miller received his M.S. degree in chemical engineering in 1950. He joined an Enjay affiliate that same year, working first as an engineer in the Baton Rouge Refinery's petroleum technical service. He later served as a supervisor in various technical service and operating departments.

The new Plastics and Resins Division was formed on August 15, 1960, when Enjay, the petrochemicals division of Humble Oil & Refining Co., combined the product management functions for Buton and petroleum resins and Escon polypropylene into one division. C. E. Farnsworth, who had been serving as product manager—plastics, has been named to head the combined Plastics and Resins Division.

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VISTANEX® LM

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VISTANEX LM
Polyisobutylene polymers of viscous, soft, gummy consistency having average molecular weight range of 8,700 to 11,700.

BUTYL
Isobutylene-Isoprene co-polymers of solid rubber consistency having average molecular weight range between Vistanex LM and MM.

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VISTANEX MM
Polyisobutylene polymers having a high degree of elasticity and average molecular weight range of 64,000 to 135,000.

These polymers, because of their excellent resistance to aging, ozone and chemicals, viscosity stability over wide temperature range, and their permanent tack, offer the compounder great latitude in designing and formulation for:

- Cements
- Pressure sensitive adhesives
- Laminating adhesives
- Caulking and sealing compounds
- Tackifiers
- Blending with polyethylene or wax

Also for other applications such as: impregnating leather, binder for eraser compounds and base for paints.

FOR INFORMATION on any of these materials . . . write or phone your nearest Enjay office. *Home Office:* 15 West 51st Street, New York 19, N. Y. *Other Offices:* Akron • Boston Charlotte • Chicago • Detroit Houston • Los Angeles • New Orleans Plainfield, N. J. • Tulsa

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names in the news

George A. T. Moore has been appointed assistant manager of paper sales for the A. E. Staley Manufacturing Co., Decatur, Ill.

Dr. Arthur B. Cummins, manager of Central Chemical and Physical Research Department at Johns-Manville Research Center, Manville, N.J., has retired after 36 years of service. **Dr. L. R. Blair** has been named to succeed Dr. Cummins, and **Dr. F. L. Pundsack** succeeds Dr. Blair as chief of the Basic Chemistry Research Section.

John W. Beard has joined Richardson Co., Melrose Park, Ill., as assistant chemist.

William R. Whitaker has been appointed sales manager of the Plastics Products Division of Advance Solvents & Chemical Division, New Brunswick, N.J.

Roger C. Corwin has joined the International Chemical Development and Operations Department of Food Machinery & Chemical Corp., New York, N.Y.

William R. Bradley, formerly assistant director of environmental health at American Cyanamid Co., New York, N.Y., has been named head of William R. Bradley & Associates, Newark, N. J., consultants on environmental health.

Dr. Hugh J. Roberts, has joined Corn Products Co., Argo, Ill., as a research chemist in the Technical Division.

Dr. Gerald A. Harlow has been named research supervisor in the Analytical Department of Shell Development Co., Emeryville, Calif.

Donald T. Ellis has been named general manager of the Container and Chemical Specialties Division of Dewey & Almy Chemical Division, Cambridge, Mass.

Dr. John E. Hanle has been appointed associate director of research in high polymer chemistry in the Central Research and Engineering Division of Continental Can Co., New York, N.Y.

Stanley W. Cairns has been named sales representative for the Chemical Division of General Mills, Philadelphia, Penna.

E. W. Carey has been elected president and chief executive officer of Fibreboard Corp., San Francisco, Calif.

Paul E. Paules has been appointed western regional manager for the Scientific and Process Instruments Division of Beckman Instruments, Inc., Palo Alto, Calif.

Steve Proops, founder and president of Anchor Adhesives Corp., Floral Park, N.Y., has resigned from the firm.

John W. Dersch has been named plant manager at Coated Products, Inc., Middlesex, N.J.

R. N. Rear has been appointed general traffic manager for Borden Chemical Co., New York, N.Y.

Irvin P. Seegman has been elected vice-president of Products Research Co., Los Angeles, Calif.

New Permacel President

George A. Fitzgerald has been named president of Permacel Division, Johnson & Johnson, New Brunswick, N.J., succeeding George C. Riegger, who resigned as president and as a member of the Johnson & Johnson board of directors. Prior to his new appointment, Mr. Fitzgerald had been vice-president of sales and marketing. Succeeding Mr. Fitzgerald is Robert S. Bradford, who has been serving as sales manager of Permacel. The new president of Permacel joined the company in 1938 as a sales representative in the industrial tape line. He moved up through the sales organization to sales manager in 1951 and vice-president of sales in 1955. Mr. Fitzgerald attended the Wharton School of Business.

Mr. Bradford was educated at Hillyer College and the University of Chicago. He has been with the parent company and Permacel for 13 years in various sales capacities. He managed Johnson & Johnson sales divisions in Buffalo, Boston, and Detroit, and later was named assistant to the vice-president of sales. Before becoming sales manager of Permacel in March 1960, Mr. Bradford was general manager of a Johnson & Johnson sales company in New England.

G. A. Fitzgerald

Staley Names Schuman

Richard E. Schuman has been appointed manager of operation and planning in the Research Division of A. E. Staley Manufacturing Co., Decatur, Ill. Mr. Schuman's new duties will include research division financial and organization planning, and administering service functions of the firm's new research center now nearing completion at Decatur. Prior to his present appointment, he was technical service administrator. Mr. Schuman graduated from Iowa State College in 1949 as a chemical engineer. He joined Staley as a chemical engineer in 1951.

Armour Names Agents

Two new ammonia distributors have been appointed by Armour Industrial Chemical Co., Chicago, Ill. McKesson & Robbins, Inc., Columbus, Ohio, and Thompson-Hayward Chemical Co., Oklahoma City, Okla., are the two new authorized distributors for Armour anhydrous ammonia. Both companies will handle the sale of ammonia in cylinders and tank truck quantities. The recent additions bring the number of Armour ammonia distribution points to 185.

Talk On Coatings Tariffs

Representatives of the surface coatings industry in the United States stated, at a recent meeting with officials of the U.S. Department of Commerce, that tariffs, quotas, licensing and exchange restrictions, special import fees, and the development of a domestic paint industry in many countries are combining to limit the opportunities of the surface coatings segment of the United States chemical industry to expand its markets abroad. The meeting was the 22nd of a series the Department of Commerce is holding to pinpoint the foreign trade obstacles which key American industries are encountering in their efforts to sell in other countries.

The surface coatings manufacturers, who produce paints, varnishes, lacquers, and other related materials, did an export business in excess of $32 million last year—a figure which represented less than 2 per cent of their total production. Industry spokesmen pointed out that the trade restrictions and local competition encountered have resulted in a steady decline in this trade. High tariffs were described as a distinct impediment to foreign trade expansion, and Latin America was cited as an area in which licensing restrictions are a handicap. It was pointed out that some Latin American tariffs were as high as 80 per cent.

NPA Submits Standards

Two particleboard standards were submitted to government agencies by the Task Group on Standards of the National Particleboard Association. One standard, "Recommended Commercial Standard for Mat-Formed Wood Particleboards," was submitted to the Commodity Standards Division of the Department of Commerce, and the other standard, "Physical Property Specifications for Mat-Formed Wood Particleboard for Floor Underlayment," was submitted to the Architectural Standards Division of the Federal Housing Administration.

The "Recommended Commercial" standard was a revision by the NPA's Technical Committee following an initial circulation to the industry. The Commodity Standards Division, after review, will circulate the standard again to individual manufacturers, distributers, and users, asking statements of acceptance. This is the final step prior to promulgation of an industry commercial standard by the United States Department of Commerce.

3M Plans Decatur Line

Minnesota Mining & Mfg. Co., St. Paul, Minn., will add new production facilities for Kel-F brand chemicals to the chemical plant it has under construction at Decatur, Ala. The materials, acquired from M. W. Kellogg Co., in 1957, are now produced at Jersey City, N.J. The Kel-F chemicals and fluorochemical stain repellers will be the major products of the Decatur plant, in addition to a line of specialty chemicals, the company states. The Jersey City operation will be closed when the new plant begins scheduled operations in the Spring of 1961.

The company reports that it will expand its reflective products plant at Guin, Ala., by more than 80 per cent. A 109,000 square foot addition to the present 132,000 square foot plant is under construction and is expected to be completed early in 1962. According to 3M this will be the third expansion of the Guin plant since it began operation there in late 1955.

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- PETROLENE
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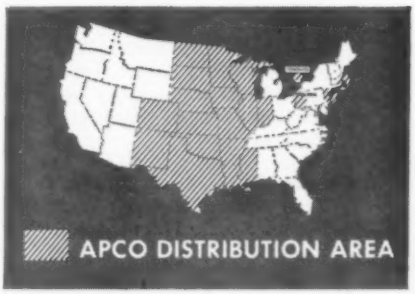

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Oct. 5-7. Hardwood Plywood Institute, Annual Fall Meeting, Dinkler Plaza Hotel, Atlanta, Ga.

Oct. 9-12. American Society of Mechanical Engineers, Rubber & Plastics Conference, Lawrence Hotel, Erie, Penna.

Oct. 10-13. Technical Association of the Pulp and Paper Industry, 10th Corrugated Containers Conference, Royal York Hotel, Toronto, Ontario, Canada.

Oct. 11-14. Architectural Woodwork Institute, National Meeting, Sheraton-Park Hotel, Washington, D.C.

Oct. 13. Paper and Packaging Materials Seminar, Sponsored by the Quartermaster Association, Statler Hilton Hotel, Washington, D.C.

Oct. 13-14. Committee D-14 on Adhesives, American Society for Testing Materials, Del Prado Hotel, Chicago, Ill.

Oct. 13-14. Society of the Plastics Industry, 16th Annual New England Section Conference, Wentworth--by-the-Sea, Portsmouth, N.H.

Oct. 14-23. French Packaging Institute, 1st International Packaging Machinery Show, Paris, France.

Oct. 16-19. Technical Association of the Pulp and Paper Industry, 15th Plastics-Paper Conference, Hotel Syracuse, Syracuse, N.Y.

Oct. 17-21. Forty-Eighth National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago, Ill.

Oct. 17-21. National Metal Exposition and Congress, Trade and Convention Center, Philadelphia, Penna.

Oct. 18. Commercial Chemical Development Association, Joint Meeting with the Chemical Economics Division, Chemical Institute of Canada, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Oct. 23-27. Technical Association of the Pulp and Paper Industry, 15th Engineering Conference, Robert Meyer Hotel, Jacksonville, Fla.

Oct. 24-25. Society of Packaging and Handling Engineers, Maryland Division, 6th Annual Eastern Industrial Packaging and Handling Show, Fifth Regiment Armory, Baltimore, Md.

Oct. 24-26. Envelope Manufacturers Association of America, Annual Convention, Waldorf-Astoria Hotel, New York, N.Y.

Oct. 25-26. Industrial Adhesives Applications Symposium, University Extension Division, University of Wisconsin, Madison, Wisc.

Oct. 25-27. American Standards Association, National Conference on Standards, Sheraton-Atlantic Hotel, New York, N.Y.

Oct. 26-27. Industrial Hygiene Foundation, 25th Annual Meeting, Mellon Institute, Pittsburgh, Penna..

Oct. 27-28. American Society of Industrial Designers, 16th Annual Conference, Edgewater Beach Hotel, Chicago, Ill.

Oct. 27-28. Cellulose Research Institute, 3rd Cellulose Conference, State University of Forestry, Syracuse University, Syracuse, N.Y.

Oct. 27-29. National Paint, Varnish and Lacquer Association, 73rd Annual Meeting, Drake Hotel, Chicago, Ill.

Oct. 30-Nov. 2. Federation of Societies for Paint Technology, 38th Annual Meeting and 25th Paint Industries' Show, Sherman Hotel, Chicago, Ill.

Oct. 31-Nov. 2. Packaging Institute, 22nd Annual National Packaging Forum, Statler Hilton Hotel, New York, N.Y.

Oct. 31-Nov. 4. American Management Association, Packaging Management Course, Hotel Astor, New York, N.Y.

Portrait Of

E. PATRICK McGUIRE

E. Patrick McGuire has spent nearly his entire professional career in the adhesives industry. Presently technical service manager for the Packaging Adhesives Group, The Borden Chemical Co., New York, N.Y., he was formerly a member of the research staffs of The National Starch & Chemical Corp. and the Adhesives Products Division of Swift & Co.

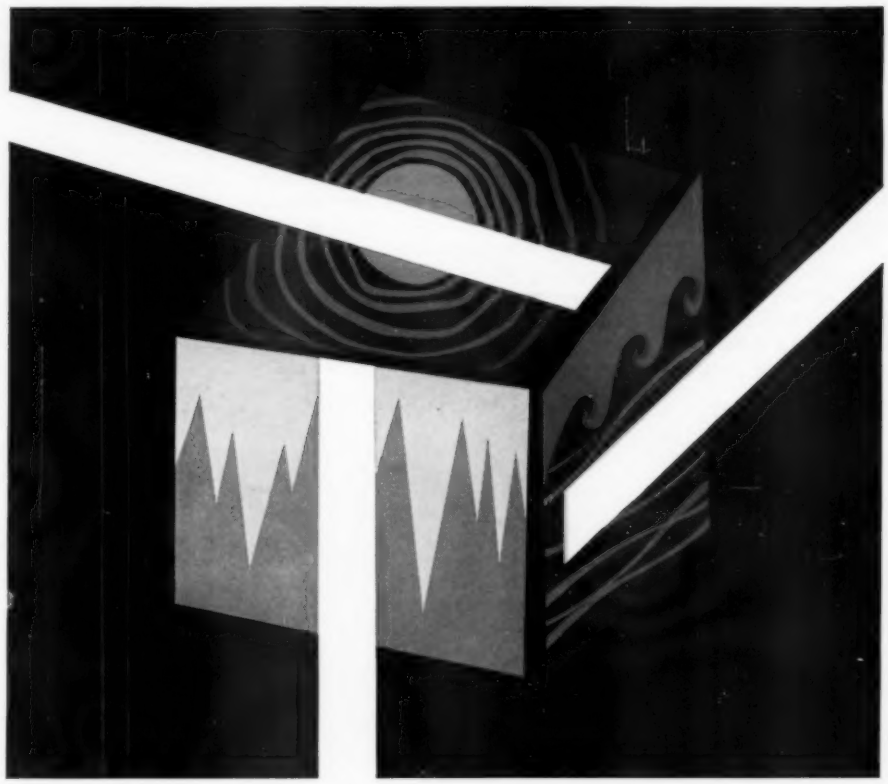
Among the more prolific writers in the field of adhesive technology, Mr. McGuire is the author of a number of reports and articles dealing with problems that have plagued the industry. Among some of the topics he has covered are "Foaming as an Adhesive Problem," "Adhesives Viscosimetry," and "Overgrading."

Mr. McGuire's field of specialization lies in aqueous adhesive systems. A familiar figure in the paper converting industry, he has traveled widely through the United States and Canada in his duties as a consultant on adhesive problems peculiar to the industry.

His duties with Borden include the preparation and gathering of data for technical reports on the company's products, the technical education of company sales personnel, and liaison with the research groups of clients working on production line application problems. He is also frequently called upon to deliver talks on adhesives and adhesion before industrial and university groups.

SILICONE NEWS from Dow Corning

Sticks Here...Here...Here



In Heat, Cold and Moisture Silicone Adhesives Hold!

The exceptional durability of Dow Corning pressure sensitive silicone adhesives makes them dependable for tapes, sealants, spray-on coatings, bonding materials and splicing agents. Perhaps there's a special property you need in an adhesive . . . or a special *combination* of properties? Here, briefly, are the properties of Dow Corning silicone adhesives. Silicones may offer exactly what you need.

They stick anywhere! At temperatures ranging from −80 to 500 F, pressure sensitive silicone adhesives stay stuck and don't deteriorate. They withstand the effects of moisture, oxidation, corrosive chemicals, weathering, arcing, corona and fungus. For electrical applications, silicone adhesives provide excellent dielectric strength.

As tapes. Dow Corning silicone adhesives are used with most backing materials. Now readily available from several manufacturers are tapes with backings of glass cloth, Teflon, Mylar, aluminum foil, silicone rubber and combinations of these materials. Typical applications include: high temperature electrical insulation; bonding, splicing, and sealing; masking in chemical milling; release surfacing, and electroplating.

Or alone. For a fastening adhesive in rugged service, silicones may be your answer. For example, silicone adhesives in combination with asbestos fibers are used to coat and insulate hot air ducts in aircraft. Other tough applications: sealing ends of heat elements in appliances, bonding mica and asbestos panelboard, and bonding silicone rubber to the coils of electrical equipment.

Dow Corning Silicones may well be your adhesive of the future. For more technical information or assistance, **write Dept. 0110.**

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ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

Borden In Mexico

Borden Co., New York, N.Y., and British Industrial Plastics, Ltd., have made plans for the formation of a new company to manufacture amino molding compounds in the Mexico City area. The jointly-owned corporation, to be known as Materiales Moldeables S.A. de D.V., will have an initial capacity of 1,000 tons of amino molding compounds per year. Arrangements for the cooperative venture are being worked out by British Industrial and Borden Chemical Co., a division of Borden Co. Capital requirements of $800,000 will be divided equally by the two firms. In accordance with the present policy of the Mexican government, Mexican capital is being invited to join the new corporation.

British Industrial will be responsible for designing the new plant and for supplying original and continuing know-how in its operation. Over-all operation of the company will be handled cooperatively, with directors and committees appointed on a 50-50 basis. The company plans to erect a two-story building with a total floor area of about 15,000 square feet for production, and an area of about 7,000 square feet for warehousing of raw materials and finished products, plus the necessary office accommodations.

Narmco Develops Cure

A moderate-temperature cure cycle has been developed for Conolon 506, a laminating material, by Narmco Materials Division of Narmco Industries, Inc., Costa Mesa, Calif. The new cure is said to make it possible to utilize conventional plastic tools in fabricating laminate structures from pre-impregnated materials. Since cure temperatures as high as 350°F. have previously been required in order to obtain optimum properties from the cured Conolon 506, Narmco considered it necessary to use metal molds and forming tools.

Narmco engineers have determined, however, that more-than-adequate physical properties are obtained from the material when cured for a reasonably short period of time at a maximum temperature of 275° F. The company points out that parts formed at this temperature exceed in every respect the requirements spelled out for this type of structural laminates in general military specifications such as MIL-R-9299, and by major missile manufacturers.

Named Group Leader

John Keramedjian has been appointed group leader of the Adhesives and Rubber Section of the Technical Service Department of Schenectady Varnish Co., Schenectady, N.Y. A graduate of the University of Michigan, Mr. Keramedjian was formerly with the Research Section of the Engineering Division of Chrysler Corp., concentrating on resins and polymers with major emphasis on their use in adhesive formulations. In his new post he will be available for consultation on adhesive and rubber-compounding projects involving the use of Schenectady resins, as well as doing laboratory research.

Issues Financial Report

General Mills, Inc., Minneapolis, Minn., in its 32nd annual report to stockholders and employees, reports that for the fiscal year ended May 31 gross sales were $537,818,000 and earnings totaled $11,515,000. These figures represent the second best sales record in the firm's history, exceeded only by last year's all-time high of $545,998,000. Earnings, however, dipped $5,302,000 as compared to the record 1958-1959 figure of $16,817,466. Net earnings per share of common stock were $1.46 as compared to $2.26 last year after adjustment for a three-for-one split in common stock.

Holding Packaging Show

The Maryland Division of the Society of Packaging and Handling Engineers will hold its Sixth Annual Eastern Industrial Packaging and Handling Show on October 24 and 25 at the Fifth Regiment Armory, Baltimore, Md. According to William A. Yockel, president of the Maryland Division, the event is planned to further the purposes of the society which are defined as a clearing house for the dissemination of technical practical data and the correlation of workable techniques in the field of product protection, packaging and materials handling.

FPRS Names Huddleston

Kenneth E. Huddleston has been appointed executive secretary of the Forest Products Research Society, Madison, Wisc., succeeding Frank J. Rovsek, who has taken an executive post with the American Hardboard Association, Chicago, Ill.

Borden Appoints Loshaek

Samuel Loshaek has been appointed director of product development for Borden Chemical Co., New York, N.Y. Mr. Loshaek has been with Borden since 1955 when he joined the staff at the firm's central research laboratories in North Philadelphia, Penna., as a group leader. Mr. Loshaek holds a B.S. degree in chemical engineering and an M.S. degree in chemistry from the University of Alberta. In 1950, he received his Ph.D. in chemistry from the University of Wisconsin. Prior to joining Borden, he was associated with Rohm & Haas as a group leader working in basic polymer research and applications research. In 1957, Borden named him to head up its thermoplastic laboratory, the post he has held until his present assignment.

Schenectady Names Two

Schenectady Varnish Co., Inc., Schenectady, N.Y. has appointed Robert L. Schwan as manager of product sales, and Andre J. Bourgeois as purchasing agent. Mr. Schwan will direct domestic sales and marketing of the firm's plywood adhesive, laminating, abrasive, can coating, and cork binder resins. He formerly was affiliated with National Lead Co., Catalin Corp. of America, and Varcum Chemical Corp., in technical sales and sales management positions.

Mr. Bourgeois, a graduate of St. Bonaventure University with a degree in business administration, joined Schenectady Varnish in 1956. He has served the firm in a wide variety of capacities, including manufacturing and finance.

Glycerine Awards

The Glycerine Producers' Association reports that the scope of the Ninth Annual Glycerine Research Awards, scheduled to be awarded in January 1961, will be broadened to give special recognition and emphasis to practical applications for glycerine and its derivatives. Two awards, of $750 and an honor plaque, will be given in recognition of outstanding work—one in the field of basic research, the other for practical glycerine application. The awards, established by the Glycerine Producers' Association in 1952, are given annually for new and independent research contributing to knowledge and use of glycerine and its derivatives.

VINOL

SOON ON THE WAY

polyvinyl alcohol

New Airco VINOL Polyvinyl Alcohol in grades designed for use in compounding colloidal thickeners and rapid-adhering, remoistenable, and wet strength adhesives.

Available soon, Airco VINOL—a group of polyvinyl alcohol resins tailored for specific uses—has unusual versatility... is moderately priced. In many adhesive applications, it warrants comparison with starch, casein, latex and other synthetic resins. Whether you are using polyvinyl alcohol or a competitive material, Airco VINOL offers you many advantages in adhesives and thickeners.

VINOL polyvinyl alcohol resins provide a wide range of characteristics such as water solubility, water resistance, adhesion to porous or non-porous surfaces, toughness, flexibility. Other key properties are resistance to grease, solvents, and bacterial decomposition.

VINOL grades represent a range of properties, reflecting differences in degree of hydrolysis and polymerization. However, all dissolve easily in water and form colorless solutions; all have little tendency to dust. Airco's exclusive continuous manufacturing process turns out resins of consistently high quality.

The Colton Chemical Company, a division of Air Reduction Company, Inc., is currently supplying batch grades of VINOL which are tailored for adhesives applications. Colton maintains an experienced adhesives applications staff in its technical service laboratory in Cleveland, Ohio. Both this backlog of practical polyvinyl alcohol knowledge and technical bulletins on certain VINOL grades are freely available to you. To receive the latest information on VINOL polyvinyl alcohol resins, let us put your name on our mailing list. We'll be glad to send you samples and technical bulletins as they become available.

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By MELVIN NORD

Bonding Apparatus for Metals

U. S. Patent 2,935,116, issued May 3, 1960 to Warren H. Drebing and assigned to General Dynamics Corp., describes an apparatus for bonding metal to metal through the medium of pressure/heat sensitive bonding materials.

The heating platens and the force applying means (12) are illustrated in connection with the assembled components of a typical composite flat structural panel (40). The panel comprises an inner skin panel and an outer skin panel separated by a metallic honeycomb-like cellular core material and peripheral edge members. These various components are to be bonded together under pressure and heat into a fixed unit by means of a suitable metal bonding adhesive, which is disposed between the faying surfaces of the individual components. The adhesive may be provided in brushed-on form as a layer of material or in conventional type form.

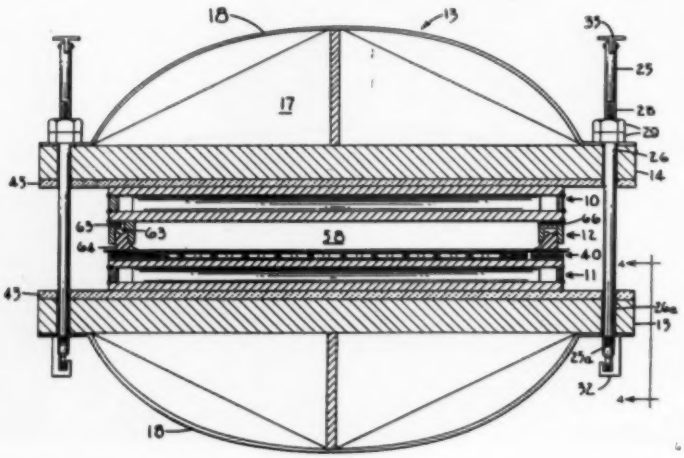


Figure 1

The present invention contemplates a relatively inexpensive, small, and semi-portable pressure restraining apparatus with simple and efficient means for applying uniform and controlled heat and pressure (in a relatively large range) in a manner that is safe, economical and easy to adapt to mass production.

As shown in Figure 1, the apparatus consists of a pair of temperature imparting platens (10 and 11) and a force applying arrangement supported on a restraining fixture (13).

Restraining fixture consists of an upper casting (14) and a lower casting (15) which serve as the "head" and "bed" of the fixture. The head and bed are of relatively heavy construction and are provided with suitable reinforcing ribs (17) to prevent warping. A fairing (18) is provided on both the head and the bed to enclose the ribbed portions. The head is rigidly affixed to a supporting frame; the bed is movably supported from the head by a pair of hydraulic actuator means.

Adhesive for Laminates

U. S. Patent 2,935,486, issued May 3, 1960 to Andrew F. Sayko and Raymond G. Newberg, assigned to Esso Research & Engineering Co., provides a method for producing a high quality laminated sheet material using asphalt, as a basic element of the adhesive and water-proofing medium.

The present invention is based on the discovery that the addition of a small quantity of a certain type of hydrocarbon copolymer and a critical quantity of an oil of low aromatic content to an asphalt, preferably an oxidized asphalt, produces an excellent cement for use in the manufacture of laminated paper, at the same time imparting waterproofing properties to the product. The polymer and oil apparently function to retard migration of the asphalt into the paper, thereby improving its low temperature flexibility.

Protein and Nonionic Agent Compositions

U. S. Patent 2,933,406, issued April 19, 1960 to Harold K. Salzberg and Clifford J. King, assigned to The Borden Co., discloses a process for making a coating and film-forming composition for use in aqueous solution, to leave on drying a film substantially free from microscopic pinholes and other imperfections caused by retained air.

The process consists of mixing an adhesive consisting essentially of alkali soluble protein in dry form containing not more than 15 per cent of water on the weight of the protein *i.e.*, casein, soy protein, or gelatine with a nonionic surfactant serving as a bubble release agent, *i.e.*, a water- or ether-soluble surface active ether, ester, ether-ester, or ether-alcohol in the proportion of 1-10 parts by weight for 100 parts of the protein, and maintaining the contact between the protein and the nonionic surfactant and continuing the mixing in dry condition until the agent becomes in part nonextractable from the mixture by ether.

Putty Powders

U. S. Patent 2,929,734, issued March 22, 1960 to Brack B. McHan and assigned to Calcium Carbonate Co., discloses a putty composition which exhibits a high degree of plastic flow, cohesion and adhesion with minimized combined oil vehicle requirements.

The composition consists of a treated pulverized limestone powder and a drying oil vehicle in proportions yielding a putty-like consistency. The powder particles are provided with surface coatings of a heavy-bodied and highly viscous drying oil applied to the particle surfaces prior to putty composition formation.

Metal-to-Metal Bonding

U. S. Patent 2,934,820, issued May 3, 1960 to Leo J. Novak and Jack J. Bulloff and assigned to Union Carbide Corp., relates to bondings for structural metals which are subject to high temperature and/or low pressure conditions in the course of their use. A bonding agent is used which adheres tenaciously to the metallic components and expands and contracts with them to substantially the same extent.

Figure 2 shows a pair of metal bodies in the form of titanium plates (1 and 3) with small metallic spongy iron particles (5) between them.

Secured over the metal bodies is a sheet metal structure (7) which extends across the top of body 1 and down the sides of the bodies to the base edge of body 3. This metal closure member fits the bodies snugly and is provided with inlet conduits (9) and outlet conduits (11); extending up from the base over the edges of the closure member (7) is a cap (13) also of sheet metal which snugly fits over the closure member and engages against the base of the body (3).

To deposit metal in the intervening spacing around the iron spheres (5), the assembly described is placed in an oven with the conduits (9 and 11) extending out of the oven and with the valves (15) of conduits (11) closed. The sheet metal housing substantially closes the spacing between the metal bodies and the oven heats the bodies and housing up to the decomposition temperature of a thermally decomposable metal bearing gas, such as nickel carbonyl; the decomposition temperature range for this gas is preferably between 350° F. and 400° F. and the assembly temperature should be in this range. The bodies themselves expand in the heat more than the thin housing and a very tight seal is insured between the same during plating.

The spacing is then evacuated through conduits 9 and valves 10 by pumps, and upon attainment of substantially complete evacuation, nickel carbonyl is led into the spacing through conduits (11) and valves (15), the valves (10) being open and the conduits (9) connected to a vacuum-producing source.

As the gaseous carbonyl contacts the hot metal it decomposes, depositing nickel in the spacing around the solid material and on the adjacent surfaces of the metal bodies to bond the assembly together. The pumps are meanwhile operated to withdraw carbon monoxide and other gases of decomposition from the spacing as the gases form.

When the spacing between the bodies has been filled the assembly is permitted to cool in the oven, is thereafter withdrawn, and the housing removed from the metal bodies and the bonding agent. It will be found that substantially none of the

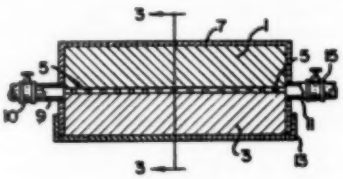


Figure 2

nickel creeps in between the sheet metal housing and the metal bodies and that the bonding agent will have only slightly roughened edges adjacent to the conduits. These edges may be readily smoothed off to provide a surface flush with the metal bodies.

The nickel bonding agent will have substantially all of the properties of pure nickel and may be provided with machine fittings if desired for securing the bonded assembly to other structural parts. The temperature resistance of the nickel is high for it melts at about 2600° F. Further the shear strength of the bond is good and the bond itself, due to the nature of the deposition process, has a degree of flexibility.

Bonded Fibrous Insulation

U. S. Patent 2,931,738, issued April 5, 1960 to Joseph P. Stalego and assigned to Owens-Corning Fiberglas Corp., discloses a bonded high temperature fibrous insulation product.

The product consists of glass fibers arranged as a porous base and a binder securing the fibers to each other into a bonded insulation material. The binder consists of the combination of an alkyd resin and a urea-borate condensation reaction product.

Preparation of Starch Derivatives

U. S. Patent 2,935,510, issued May 3, 1960 to Otto B. Wurzburg and assigned to National Starch & Chemical Corp., provides a method for making new starch derivatives characterized by improved resistance of their aqueous dispersions to loss of hydrating capacity, clarity and texture, upon aging at low temperatures or upon repeated freezing and thawing.

The process involves a combination of two chemical reactions on the starch. One reaction is the treatment of the starch with a polyfunctional etherification or esterification reagent, which results in a bridging or cross-linking of the hydroxyl groups in the starch granule. The other reaction is the acylation of the starch with acetic or propionic anhydride.

Other Patents of Interest

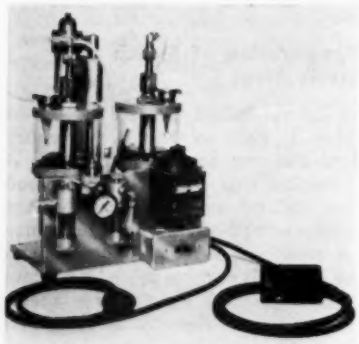
Subject	Investor or Assignee	Patent No.	Date
Hydraulic cement mortar	Tile Council of America, Inc.	2,934,932	5/3/60
Paper containing a starch ether	National Starch & Chemical Corp.	2,935,436	5/3/60
Preparation of starch carbamates	Corn Products Co.	2,935,509	5/3/60
Glue applicator	Clemence A. Bins	2,935,961	5/10/60
Method of pasting by machine	North American Phillips Co.	2,937,105	5/17/60
Pressure-sensitive adhesive tape	Johnson & Johnson	2,937,109	5/17/60
Production of self-adhesive sheets or tapes	P. Beiersdorf & Co. A. G.	2,937,956	5/24/60
Cold water dispersible laundry starch	Corn Products Co.	2,938,809	5/31/60
Production of reinforced rubber products and adhesives	B. B. Chemical Co.	2,938,876	5/31/60

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

new equipment

Automatic Epoxy Dispenser

Model 100 Nuplabond machine is a small, self-contained, high-speed unit for metering, mixing and dispensing two component plastic systems, such as epoxies, etc. Utilizing



pneumatic, hydraulic, electrical, and mechanical principles, the Model 100 automatically performs the following operations: pumps a controlled amount of each component from its reservoirs to the mixing chamber; cycles itself through a controlled motor driven shear and agitation mixing operation; and dispenses the measure mixed charge with a positive drip-proof cut-off. According to the manufacturer, the machine assures uniform volume, hardening, and strength of dispensed two component systems, and eliminates waste encountered in hand mixing. In addition, the unit is easily adjusted to a wide range of cycles and materials, simple to operate, easy to clean, and is designed to be used manually, or adapted to any automatic or semi-automatic production line as a stationary piece of equipment. *New Plastic Corp.* **E-229**

Ultrasonic Cleaner

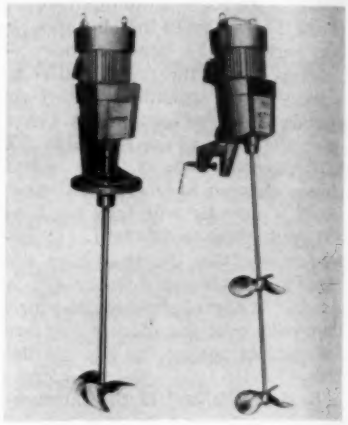
Designated Autosonic, these completely self-tuning ultrasonic cleaners are said to increase efficiency by as much as 300 per cent over conventional ultrasonic systems. Consistent maximum efficiency and maintained optimum cleaning performance is achieved through the use of an integral feedback transducer, which automatically adjusts phase and frequency for all conditions. The Autosonic units are completely self-tuning, and eliminate the need for operator training and constant operator attention. Since the only control needed is a simple on-off switch, the Autosonic also does away with the risk of abuse by untrained operators. The manufacturer reports that even operation for a reasonable length of time with an empty tank, which burns out conventional cleaners, cannot damage the error-proof cleaner, because it tunes itself to the lack of activity in the tank. A feedback transducer measures the amount of ultrasonic activity—ultrasonic waves—in the cleaning tank, and corrects output phase and frequency to maintain the standing wave condition. Consequently, maximum cavitation—the cold boiling on which all ultrasonic cleaning is based—is maintained automatically for all conditions. *Powerton Ultrasonic Corp.* **E-230**

Heated Tanks and Pots

Fast, easy and efficient dispensing of many heated materials including, adhesives, asphalt, pitch, waxes, thermoplastic, and other industrial compounds is said to be accomplished by these dispensing tanks and pots. Heat is evenly distributed at a low watt density by an exclusive blanket-type element which covers the entire tank bottom and 75 per cent of the sidewalls. Hot or cold spots are eliminated with variable dial thermostats. Standard temperature range for tanks is 250° to 500°F; and 150° to 550°F. for pots. Special thermostats are available for low temperature compounds in the 100° to 300°F. range. A heavy steel housing protects the inner cast aluminum pot on the dispensing pots, and tanks are of fabricated steel, both inner tank and housing. A glass blanket or expanded mica is used as thermal insulation. Hand, foot or solenoid operated needle valves of standard orifice provide for accurate dispensing. They are heated to insure free flow. Standard sizes are: ⅛, ¼, ⅜, and ½ inch. Other sizes are available on special order. *Sta-Warm Electric Co.* **E-231**

Portable Mixers

Designed as integral units, the line of Lightnin propeller-type portable mixers for fluid agitation is said to offer increased mixing efficiency, improved handling convenience, and maintenance-free operation. The mixers are available in sizes ranging from ⅛ hp to 3 hp, and will also be available in a fixed mounting design in all except ⅛ hp sizes. The manufacturer reports that the new Lightnin mixers offer not only direct speeds of 1750 rpm and 1150 rpm with higher impeller heads, but also



a gear-drive model speed of 350 rpm providing up to 45 per cent more flow than previous units. The mixer can be adjusted 90 degrees in the vertical plane and 360 degrees in the horizontal plane. The index pinpoints the mixer's optimum position and facilitates re-positioning in a simple, quick operation. *Mixing Equipment Co., Inc.* **E-232**

Guide Line Lights

The guide line lights is a new method for projecting marking shadow lines on all four sides of any desired square or rectangle. The new light arrangement permits a rapid, waste-free lay-up of glued sheets ready for pressing. A battery of four lights, each projecting a single black line, is used to mark all four sides of the work area desired. Workmen simply center each sheet under the markings to eliminate all possibility of short cross bands or centers. Similar batteries can be arranged for any manufacturing or processing operation requiring accurate designation of a square or rectangular area. The guide line lights will also project multiple parallel black lines or a single white line for marking dark material. *Carter Products Co., Inc.* **E-233**

Gummed Tape Dispenser

A gummed tape dispenser designed to deliver from 9 to 60 inches by electronic controls with two easy set tape lengths, each instantly in-

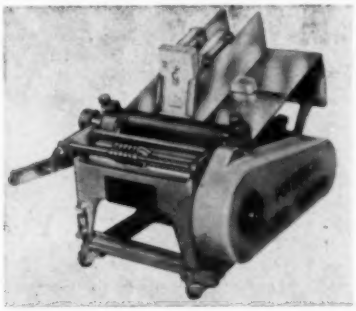
terchangeable and one random tape length for visual operation. All controls are electronic in this 10-inch by 16-inch by 11-inch machine. Hardened self-sharpened tool steel shears enable the machine to cut either kraft or reinforced tape with no adjustment. The shears operate on 110 volt, 60 cycle A.C. Adjustable tape width dividers handle tape from 2½ inches to 3 inches wide at a rate of 40 inches per second. A plastic water bottle, thermostatically controlled heater, dual moistening brushes, foot switches and printing attachments are among the features of this machine. *Diagraph-Bradley Industries, Inc.* **E-234**

Material Level Indicators

Model SG-4X material level indicator is designed for use on hazardous dust locations, and Model SG-4 is designed for all general purpose applications. The models are identical in operation and dimensions. They contain interchangeable parts and wiring, except that Model SG-4 contains a gasket between the cover and the body, while Model SG-4X has metal-to-metal surfaces and a paddle shaft bushing machined to UL specifications. These indicators may be used to indicate the level of pulverized, fine, crushed or granular materials (maximum 1") in bins and silos. They are used also to control such equipment as feeders, valves, elevators and conveyors. They exercise this control by starting or stopping the motor driving the equipment when a predetermined material level is reached. *Fuller Co.* **E-235**

Label Pasting Machine

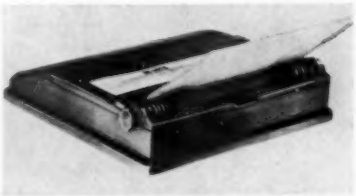
Continuous pasting of labels is accomplished at higher production speeds with the use of Model LM-6 label pasting machine. Available in hand or motor driven models, the machine handles labels of a variety of shapes. Sizes start at ½ to 2 inch



labels to 5¾ inches by any length for small machines to 8¼ inches by any length for the larger models. Motor driven, the label paster places a uniform adhesive coating on labels including those of odd shapes and sizes. The unit includes an exclusive coating control that assures application of the exact coating required for a label. The control eliminates warping, blisters, wrinkles, and oozing of paste at label edges that results from the application of an excess of coating materials. The uncoated side of the label remains clean. *Potdevin Machine Co.* **E-236**

Label Edge Strip Gluer

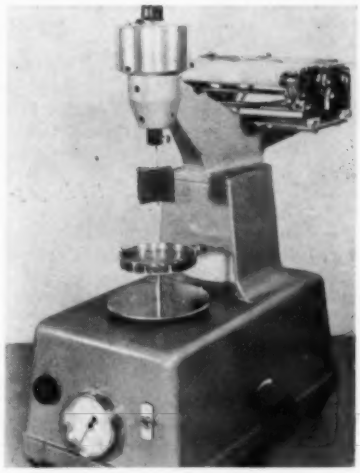
The Label-Edge-Strip-Gluer is a special gluing machine for applying strips of glue to ungummed labels. It is designed to apply any width



strip of glue to any part of a label, card, paper, etc., with a few simple adjustments by the user. The gluer consists of two components: a reservoir for storage of glue; and a set of rollers which transfers the glue from the reservoir to the label. Should the strip application become unnecessary, the unit can be converted to a full label gluer by removing the strip glue applying rollers and replacing them with a standard application roller. *Glue-Fast Equipment Co., Inc.* **E-237**

Recording Viscosimeter

The Visco-Corder is a new recording viscosimeter which combines the principles of the modified Stormer and the MacMichael instruments. In addition to its recording feature, the unit has the ability to produce data rapidly without the necessity of using a skilled operator. The Visco-Recorder can be operated with either a standard sample cup or directly on material in their cans. Apparent viscosity is sensed and recorded on the instrument strip chart recorder through a measuring shaft



by measuring torque opposed to a calibrated completely linear torque spring. Calibration data can be provided for conversion into centipoise and other units. The manufacturer suggests its use for measuring the viscosity of such materials as epoxies, gels, starches, inks, paints, plastisols, glues, oils, tar, cements, clays, and pastes *C. W. Brabender Instruments, Inc.* **E-238**

Automatic Suction Labeler

The Pony Express, an automatic suction labeler which, the manufacturer reports, will handle any shape label and container, is also said to increase production by as much as 50 per cent. It can be used for short runs as well as for volume production. A non-stop label loading feature permits uninterrupted production on large runs. The unit has a micro-controlled glue system that reportedly eliminates glue seepage and loose-corners. Capable of applying front and back labels at a rate of up to 65 per minute, the double turret machine incorporates a vacuum label handling principle. *New Jersey Machine Corp.* **E-239**

book reviews

Polystyrene. *By William C. Teach and George C. Kiessling. Published by Reinhold Publishing Corp., 430 Park Ave., New York 16, N.Y. 4 x 7½ in. 176 pp. $5.00.*

In 1957, the furniture industry alone consumed approximately 350,000 pounds of impact polystyrene. Recent statistical projections have set the probable figures for 1960 at 3 million pounds for the industry. It has further been estimated that the total potential for this material in furniture applications is 200 million pounds annually. These figures give some idea of the total all-industry potential of this popular plastic.

A simple, yet technically accurate, introduction to the chemistry, properties, manufacture and uses of polystyrene is provided in this compact volume, the eighteenth in Reinhold's excellent "Plastics Applications Series." Special attention is given throughout to the applications of polystyrene materials as a foam and by injection molding, extrusion and vacuum forming. The latest information on this material —first commercially introduced in 1938 and already occupying third place in production among all plastics—as it is used in appliances, building, packaging, housewares, toys, shoe heels, transportation, etc. is included.

In addition, much of the technical information offered by the authors will be of general interest to research workers. For example, the chapter entitled "Basic Chemistry of Polystyrene" includes an evaluation of the effects of polymerization on molecular weight and some new information on the copolymerization of styrene and alpha-methylstyrene.

Chemical Processing Nomographs. *Edited by Dales S. Davis. Published by Chemical Publishing Co., Inc., 212 Fifth Ave., New York, N.Y. 6¼ x 9½ in. 255 pp. $12.00.*

Simple nomographs—you may call them nomograms, alignment charts or line coordinate charts—consist of three scales that can be cut by a straight line in values that satisfy an equation or agree with entries in a set of tables. Chemists, chemical and other engineers, technicians and operating men find them invaluable aids in making special calculations, particularly with industrial computations that are used again and again for control and operating purposes.

The 165 nomographs offered in this collection were originally published in *Chemical Processing* and are now issued in book form along with supplemental information on how they were made. The emphasis is on how-to-do-it rather than on theory. Each entry is supported with equations, examples of application and pertinent references.

The book is divided into 15 units which cover topics from a general introduction on "How To Make Nomographs" to the working up of specific charts covering heat, the flow of fluids, vapor pressures, densities and specific gravities, etc. Contributions have been made to the volume by 52 "nomogramaniacs," *i.e.*, both those who are crazy about nomograms and those who have gone crazy while making nomograms.

Plasticizers. *By D. N. Buttrey. Published by Franklin Publishing Co., Inc., Palisade, N.J. 5½ x 9 in. 213 pp. $7.50.*

The first edition of this book was published ten years ago and was the first work to be entirely devoted to the subject. The author now brings it up to date with information on recent important developments, though the main body of the book is substantially the same.

In plasticization for vinyl resins, the last five years has seen the emergence of polymeric materials as well as new esters based on alcohols and organic acids. Though these new materials have been covered, the basic data on longer established plasticizers has not changed significantly.

Plastics and rubber manufacturers should find this collection of reference data, graphs and tables a valuable aid in evaluating available materials and selecting those best suited to their specific applications. The book includes more than 90 tables—many of them of double and triple page width—which are probably in themselves worth the price of the volume.

Labor-Management Relations. *By Charles Wiedemann. Published by Reinhold Publishing Corp., 430 Park Av. New York 16, N.Y. 5 x 7½ in. 142 pp. $3.75.*

This compact study of labor-management relations is very definitely designed as a guide for management. In the words of the jacket blurb "it debunks the mollifying approach to employees as a progressive management attitude."

Mr. Wiedemann's intention was to present in a readable and practical format a guide to the day-to-day problems of labor-management, or more specifically, union-management co-existence. Among the topics covered are: the prime union contract, "right to work" laws, management right, the strike threat, arbitration, and administering the union contract. A useful appendix offers pertinent excerpts from the Taft-Hartley Act.

Trade Literature

Olefin and Terpene Epoxides. A seven-page illustrated technical bulletin which discusses the properties and use of olefin and terpene oxides as reactive diluents for epoxy resin formulations. Entitled "Olefin and Terpene Epoxides," the bulletin gives data on the phyical properties and toxicity of these materials and reports on their application in epoxy resin castings and coatings. Three tables and 14 charts support the discussion. The effect of olefin and terpene oxides on the viscosity, pot life, exotherm, heat distortion temperature, Izod impact strength, water absorption, and tensile strength of a typical casting formulation is described. Evaluation of these diluents in epoxy-amine solution coatings is also discussed with respect to pot life, impact values and the time required to attain them, abrasion, flexibility, and sward hardness. Advantages of the materials in each application are cited. The bulletin, a reprint of a technical paper authored by R. J. Gall, J. J. Rizzo, and H. M. Castrantes, covers research undertaken in the development of the company's new Oxiron epoxy resins. *Food Machinery & Chemical Corp.* L-277

Chemical Derivatives. A new 21-page brochure listing the properties and giving laboratory procedures for the preparation of derivatives of tetramethyl-1,3-cyclobutanedione and its reduction product, 2,2,4,4-tetramethyl-1,3-cyclobutanediol. A combined total of 23 different syntheses are described in detail. Among the typical reactions of the -dione are directions for the preparation of valerates, oximes, nitriles, imines, and amides. Procedures for the -diol include reaction with monobasic acids, dichlorodimethylsilane, and acrylonitrile. Methods for saturated polyester and alkyd formulations are also presented. The brochure is designated TDR No. N-110. *Eastman Chemical Products, Inc.* L-278

Data on Resyn 3600. Technical data on a new polyvinylidene chloride latex, Resyn 3600, has been compiled in a special booklet, designated Technical Bulletin 340. It supplies all key information necessary for evaluation by laboratory and production personnel.

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- **Adhesive Bonding of Reinforced Plastics—H. A. Perry. $8.75.** Survey of the design and assembly of structures and products, particularly glass-fiber-reinforced plastic products, by means of adhesives. Gives data on equipment and methods used to produce adhesive bonded joints. ☐

- **Adhesive Bonding of Metals—G. Epstein. $2.95.** Considers adhesives used with metals, indicating when an adhesive-bonded joint is advantageous; the type adhesive to use; how to use it, and how to design the joint for optimum performance. ☐

- **Epoxy Resins—Their Applications and Technology—H. Lee and K. Neville. $8.00.** Guide to the field of epoxy resins, covering the chemistry of their preparation and applications, including a section on adhesives. ☐

- **Polyamide Resins—Donald E. Floyd. $4.50.** Discusses in detail various important applications of the polymers belonging to the polyamide resin family and includes a comprehensive section on adhesives. ☐

- **Principles of High Polymer Theory and Practice—A. X. Schmidt and C. A. Marlies. $13.50.** Study of the principles of high-polymer theory and practice, with a section on adhesives, their applications, and mechanisms and factors involved. ☐

- **Recent Advances in Gelatine and Glue Research—G. Stainsby (Editor). $12.00.** Study of Collagen, and its protein gelatine, comprising papers and Proceedings of an International Conference of the British Gelatine and Glue Research Association. ☐

- **Vinyl Resins—Mayo Smith. $5.75.** Surveys applications of vinyl resins with information on their types, properties, chemistry, manufacture and fabrication. Includes information on several types of adhesives in this category. ☐

- **Epoxy Resins—Irving Skeist. $5.50.** A chapter on adhesives is included in this complete study of the entire field of epoxy resins. The author gives formulations, trade names, methods of manufacture and applications. ☐

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According to the booklet, Resyn 3600 is an aqueous disperson of vinylidene chloride copolymer, and because of its combination of barrier and application properties, it will find usage as a protective coating for packaging materials. However, the booklet also list a variety of applications which are feasible in the textile, paper, construction, agricultural, and other industries. Bulletin 340 describes fully the physical and chemical properties of Resyn 3600, both in latex and film forms. It also specifies degrees of resistance to water vapor and common gases at varying film thicknesses (along with comparative data on polyethylene films); formulating information; chemical resistance data; status of government approvals for food packaging applications; and recommended techniques for coating and handling. *National Starch & Chemical Corp.* *L-279*

Calender Starches. This 24-page brochure will be of interest to all concerned with calender sizing of paper products. Well illustrated with comparative charts and tables, the brochure surveys types of starches used and their applications, and includes numerous case histories and helpful guidance on current application and preparation techniques. *A. E. Staley Mfg. Co.* *L-280*

Industrial Releasing Agent. Release-Cote, an industrial releasing agent used to protect plant machinery, is the subject of this four-page booklet. The booklet is illustrated and includes reprints of six in-use Release-Cote applications taken from leading trade publications. Also shown are copies of industrial magazine advertising, a partial list of Release-Cote users and a list of typical uses. *Potdevin Machine Co.* *L-281*

Infra-Red Heat. The use, need, and advantages of infra-red heat is depicted in this recently-published catalog. The publication allows an engineer to understand and compute 80 per cent of his infra-red needs, and how to set-up and infra-red system. It also indicates how simple standard ovens can be erected to satisfy all but highly custom requirements. *John J. Fannon Products Co.* *L-282*

Adhesives Properties Chart. A new adhesives properties chart which contains the latest information of epoxy adhesives, their application, cure times and physical properties. The reverse side of the chart contains such information as test methods, application suggestions and availability. *Furane Plastics, Inc.* *L-283*

Gelatin and Glue. A 12-page booklet entitled "Gelatine and Glue: A Research Service for Users," the publication discusses the ways in which the organization can be of service to all users, whether they have a sufficient continuing interest to apply for associate membership or not. The booklet points out that the close link provided by the association between research worker, applied scientist, gelatin and glue user, and manufacturer, offers every opportunity for securing the most efficient and economical use of these materials. The background of the work of the association is briefly outlined in the publication. Included in the booklet is a list of some reports of interest to gelatin and glue users. *British Gelatine and Glue Research Association.* *L-284*

Protection Against Flashovers. This four-page brochure explains how 5 Compound applied to pole line insulators and electrical equipment bushings protects against excessive leakage, flashovers, and service interruptions in areas where atmospheres are contaminated by salt spray, industrial dust, or other air-borne particles. The brochure gives details on the function, application, cleaning, and durability of the product. *Dow Corning Corp.* *L-285*

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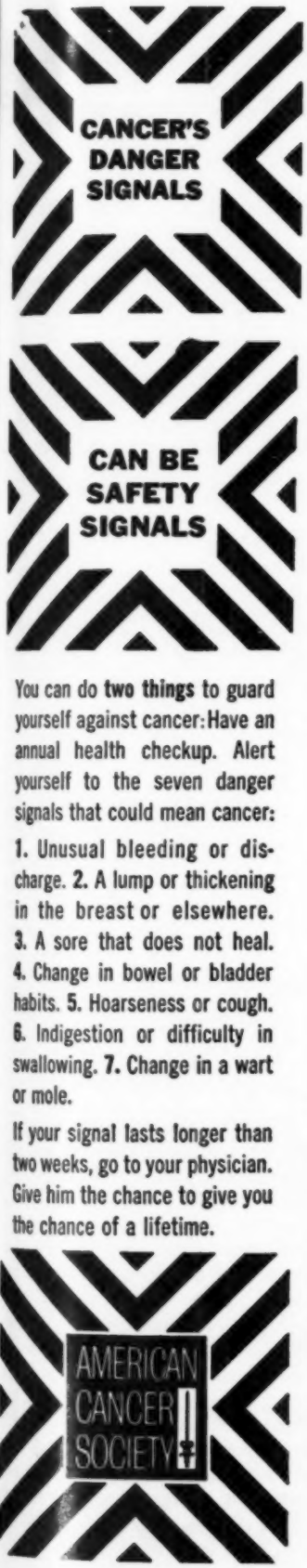
CANCER'S
DANGER
SIGNALS
CAN BE
SAFETY
SIGNALS
You can do two things to guard yourself against cancer: Have an annual health checkup. Alert yourself to the seven danger signals that could mean cancer:
1. Unusual bleeding or discharge. 2. A lump or thickening in the breast or elsewhere. 3. A sore that does not heal. 4. Change in bowel or bladder habits. 5. Hoarseness or cough. 6. Indigestion or difficulty in swallowing. 7. Change in a wart or mole.
If your signal lasts longer than two weeks, go to your physician. Give him the chance to give you the chance of a lifetime.
AMERICAN CANCER SOCIETY

CLASSIFIED ADVERTISING
OCTOBER, 1960

Rates: All Classifications except Positions Wanted:

Undisplayed, per inch or fraction.$20.00

Boxed, per inch or fraction.....$25.00

(Approximately 60 words per inch unboxed; 50 boxed. Count 5 words for box number address.)

Positions Wanted:

Set solid, no separate headings or boxes ..... $2.50 for 25 words or less; extra words. 10¢ each. Count 5 words for box number address.

Replies will be forwarded via ordinary mail without charge.

Note: Cash must accompany order.

POSITION WANTED

MARKETING: Extensive, varied experience in technical sales, promotion, market surveys and development of adhesives sales to packaging and laminating industries. Address Box A-164-P, ADHESIVES AGE.

HELP WANTED

Rubber Adhesives & Sealers Sales Head and Salesmen wanted.

Give resume and references.

Ground floor opportunity.

CONTINENTAL TAPES CO.
Cayce, S. C.

SALESMEN AND TECHNICAL PERSONNEL

Leading manufacturer of adhesives and coatings embarking on a five million dollar expansion program offers excellent opportunities for experienced adhesive salesmen and technical personnel. All replies held in strictest confidence. Address Box A-163-H, ADHESIVES AGE.

CHEMISTS COMPOUNDERS with 3 or more years experience in the resin and elastomer fields for development of adhesives, sealers, and joint compounds. Degree desired. Well established company in the Philadelphia area. Opportunities for advancement. Salary range $5200-$7000, numerous benefits. Address Box A-166-H, ADHESIVES AGE.

BUSINESS OPPORTUNITIES

PRODUCTION FACILITIES WANTED

Manufacturer of nationally distributed quality brand natural rubber solvent cement, packaged in several sized containers for dealer trade, seeks manufacturer with clean and suitable facilities to take on all phases of production on a continuous arrangement. Replies must be by principals only. Address Box A-167-B, ADHESIVES AGE.

EQUIPMENT FOR SALE

UNION MODEL 5-B 50" double roller coater, 4" steel coating rolls, material thickness 0 to 4", complete with extras. Used three months. Address: ACOUSTICS MANUFACTURING CORP., 17210 Gable St., Detroit, Mich.

BAKER-PERKINS size #15-UUMM Dispersion Mixer, jacketed, cored dispersion blades, 100 HP XP drive, compression cover, motorized tilt. PERRY EQUIPMENT CORP., 1414 N. 6th St., Phila. 22, Pa.

ADVERTISING SALES STAFF

Advertising Sales Manager
CHARLES T. JANSEN

Advertising Representatives

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Phone: Turner 4-9624

JIM SUMMERS & ASSOC.
35 East Wacker Drive
Chicago 1, Ill.
Phone: Andover 3-1154

CHRIS DUNKLE & ASSOC.
740 South Western Ave.
Los Angeles 5, Calif.
Phone: Dunkirk 7-6149

420 Market St.
San Francisco 11, Calif.
Phone: Sutter 1-8854

B. G. EDSTROM
15605 Madison Ave.
Cleveland 7, Ohio
Phone: Lakewood 1-7900

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in passing

Weight and Volume

According to *Modern Packaging*, crackdown is certain where weight or volume consistently runs below label statement. Chester T. Hubble of F&DA's Bureau of Enforcement reported to a recent Weights and Measures Conference on 106,695 retail packages checked by F&DA. Worst performers, he said, were corn meal, with 39% of package lots checked having short content; butter, 33.6%; margarine, 29%; salad dressing, 27%; coffee, 26.4%; sugar, 24%. Foods with low frequency of short content were baby foods, under 1%; candy bars, 2.7%; fruit-juice concentrates, 4.2%; potato or corn chips, 5%.

Specialization

One of our British friends, W. M. Buchan, has succeeded in putting a dilemma bedevilling modern industry into a Parkinsonian nutshell. In his introduction to the just-published "Engineering Design with Rubber," Mr. Buchan suggests "that a delay in progress may occur because the specialist getting to know more and more about less and less gets to know everything about nothing. He has to collaborate with the non-specialist who after busily learning less and less about more and more has ended up knowing nothing about everything."

Fringe Benefits

The cost to employers of fringe benefits for their workers has more than doubled since 1947, rising much faster than employees' basic pay. In 1947, the average annual cost of fringe benefits per employee was $424 and the average pay was $2,753. Ten years later, the fringe benefit cost had risen to $981, and the average pay to $4,500. Today, fringe benefits are estimated to cost more than $1,100 per worker, while the average pay has risen to an estimated $5,000-plus. In addition, there is a definite trend toward longer vacations which is adding to the indirect costs faced by employers.

Come Now

When asked why he and his wife had bought two white Valiants, identical even to their red upholstery, an executive in Webster Groves, Mo., gave this explanation: "We don't want our friends to think we own two cars."

All Lit Up

Cigarette men still scramble for packaging gimmicks, trying to get a conversation piece as valuable as Marlboro's first flip-top box. The old idea of the "self-lighting" cigarette—with a coating on the tip that would ignite when scratched along the side of the package—has recently been considered by one medium-size brand. But the company denies it will be adopted, even though ad copy is known to have been prepared.

Sad, Sad Story

A man in Melbourne, Australia, became more and more upset when a strange car remained parked in front of his garage for days. He became so angry, in fact, that he broke the car's headlights, flattened the tires and was in the process of demolishing the body when the phone rang. A voice wanted to know if he was enjoying the new car he had ordered—and which had been delivered to his home in the middle of the night.

Semantics

Ever wonder why a tire is called a tire? According to the Goodyear Tire & Rubber Co., it was so named because it was "attire" or covering for a wheel. The highly-developed pneumatic tire of today is much more than just a wheel covering. It is credited with translating the power and handling potential of a vehicle into top highway performance.

Salary Problems?

In order to have the same purchasing power as a man earning $5,000 in 1939, today's breadwinner must have a gross salary of more than $12,000, according to the National Industrial Conference Board. Federal Income and Social Security taxes take a $1,875 bite, while that old bugaboo—inflation—accounts for $5,500.

Responsibility

Acting on rising business interest in the development of programs for self-regulation, the nation's Better Business Bureaus have adopted a "Declaration of Responsibility," charging all segments of business with responsibility for the maintenance of advertising integrity and customer confidence.